33HC

ICB-2010

US Model

CITIZENS BAND TRANSCEIVER

SPECIFICATIONS

GENERAL

Operating Frequency:	Within the 26.965 – 27.405 MHz band 40 channels full coverage (on page 26)
Antenna:	External Antenna Connector coaxial connector type SO-239
Communication System:	Push-to-talk system
Power Requirement:	13.8 V dc (from positive or negative grounded 12 V car battery)
Dimensions:	209 (w) x 64 (h) x 256 (d) mm 8¼ (w) x 2½ (h) x 10⅛ (d) inches including projecting parts and controls
Weight:	2.1 kg, 4 lb 10 oz

TRANSMITTING SECTION

Transmitting Power:	4 W
Frequency Tolerance:	±0.005 % (–30°C to +60°C)
Circuitry:	P. L. L. synthesizer with quartz crystal controlled circuit
Modulation:	Collector modulation in final and driver stage
Current Drain:	1 A without modulation
Spurious Response:	More than 60 dB

RECEIVING SECTION

Circuitry:	P. L. L. synthesizer with quartz crystal controlled circuit Dual conversion superheterodyne
Maximum Sensitivity:	Less than 0.6 μV, at S/N = 6 dB
Selectivity:	–60 dB at 10 kHz
Intermediate Frequency:	1st: 10.695 MHz 2nd: 455 kHz
Audio Power Output:	1.5 W (AM) at 10 % distortion 4.0 W (PA)
Current Drain:	270 mA at zero signal
Speaker:	9.2 cm (3⅝ inches) dia. 8 ohms

NOTICE

REPAIR AND ADJUSTMENTS (OTHER THAN THE SPECIFIED OPERATING ADJUSTMENT) BY PERSONS NOT HOLDING A VALID FCC FIRST OR SECOND CLASS RADIOTELEPHONE OPERATORS LICENSE IS ILLEGAL. USE OF REPLACEMENT PARTS OTHER THAN THE EXACT SONY REPLACEMENT PARTS APPROVED FOR USE IN THIS DEVICE IS ILLEGAL.

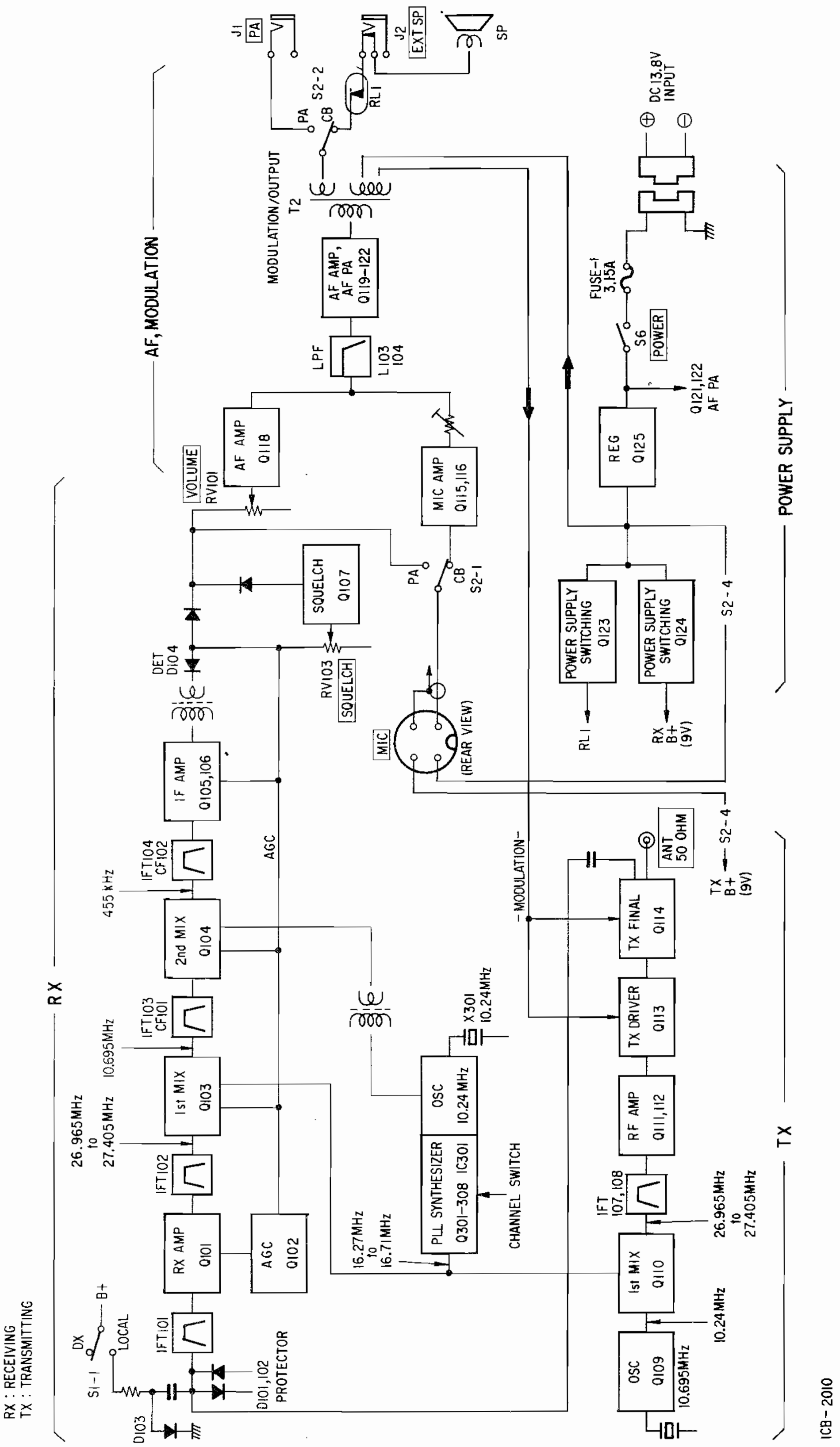
SONY®

SERVICE MANUAL

33HC

SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM

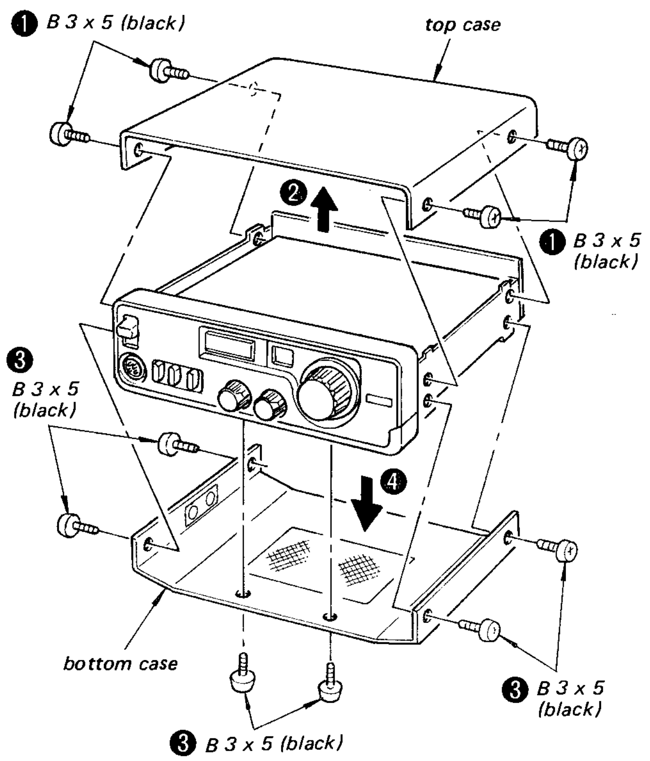

RX : RECEIVING
TX : TRANSMITTING
AF, MODULATION
RX
TX
POWER SUPPLY
J1
PA
J2
EXT SP
SP
S2-2
PA
CB
RL1
MODULATION/OUTPUT T2
AF AMP, AF PA Q119-122
LPF
L103 104
AF AMP Q118
VOLUME RV101
MIC AMP Q115,116
SQUELCH Q107
PA
CB
S2-1
DET D104
RV103 SQUELCH
MIC
(REAR VIEW)
IF AMP Q105,106
IFT104 CF102
455 kHz
2nd MIX Q104
IFT103 CF101
10.695MHz
1st MIX Q103
26.965MHz to 27.405MHz
IFT102
RX AMP Q101
AGC Q102
AGC
IFT101
DX
LOCAL
S1-1
B+
D101,102 PROTECTOR
D103
16.27MHz to 16.71MHz
OSC 10.24MHz
X301 10.24MHz
PLL SYNTHESIZER Q301-308 IC301
CHANNEL SWITCH
MODULATION
DC13.8V INPUT
⊕
⊖
FUSE-1 3.15A
S6 POWER
Q121,122 AF PA
REG Q125
POWER SUPPLY SWITCHING Q123
POWER SUPPLY SWITCHING Q124
S2-4
RL1
RX B+ (9V)
ANT 50 OHM
S2-4
TX B+ (9V)
TX FINAL Q114
TX DRIVER Q113
RF AMP Q111,112
IFT 107,108
26.965MHz to 27.405MHz
1st MIX Q110
10.24MHz
OSC Q109
10.695MHz

ICB-2010

SECTION 2
DISASSEMBLY

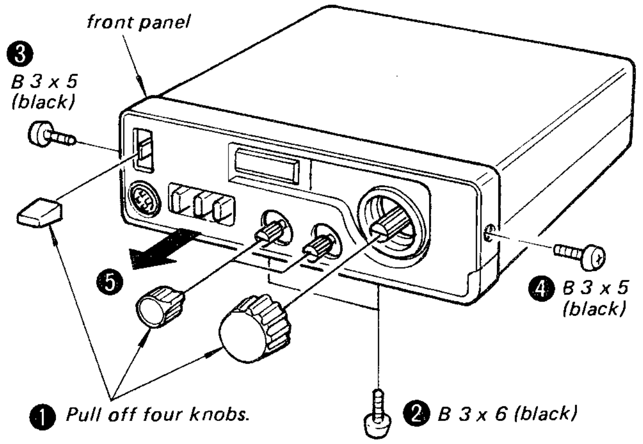
CASE REMOVAL

Top Case: ❶, ❷
Bottom Case: ❸, ❹


❶ B 3 x 5 (black)
top case
❷
❶ B 3 x 5 (black)
❸ B 3 x 5 (black)
❹
bottom case
❸ B 3 x 5 (black)
❸ B 3 x 5 (black)

FRONT PANEL REMOVAL

Note: The front panel has MIC connector mounted on it, and the front panel can be removed forward about 10 cm (4 inches).

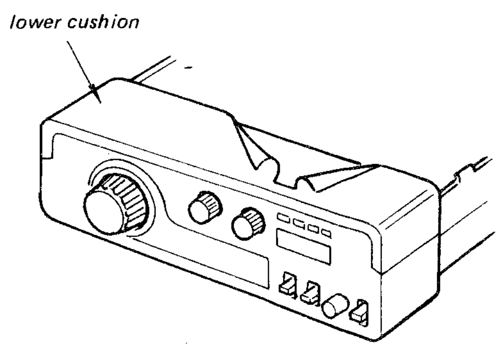

front panel
❸ B 3 x 5 (black)
❺
❹ B 3 x 5 (black)
❶ Pull off four knobs.
❷ B 3 x 6 (black)

SPEAKER REMOVAL

Remove the speaker from the speaker holder.

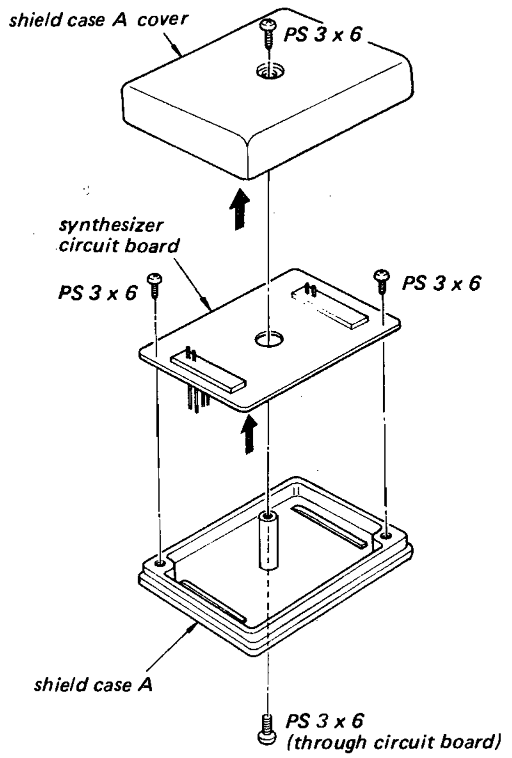
LOWER CUSHION REMOVAL

Note: Do not remove the lower cushion completely except when a lower cushion replacement is required.


lower cushion

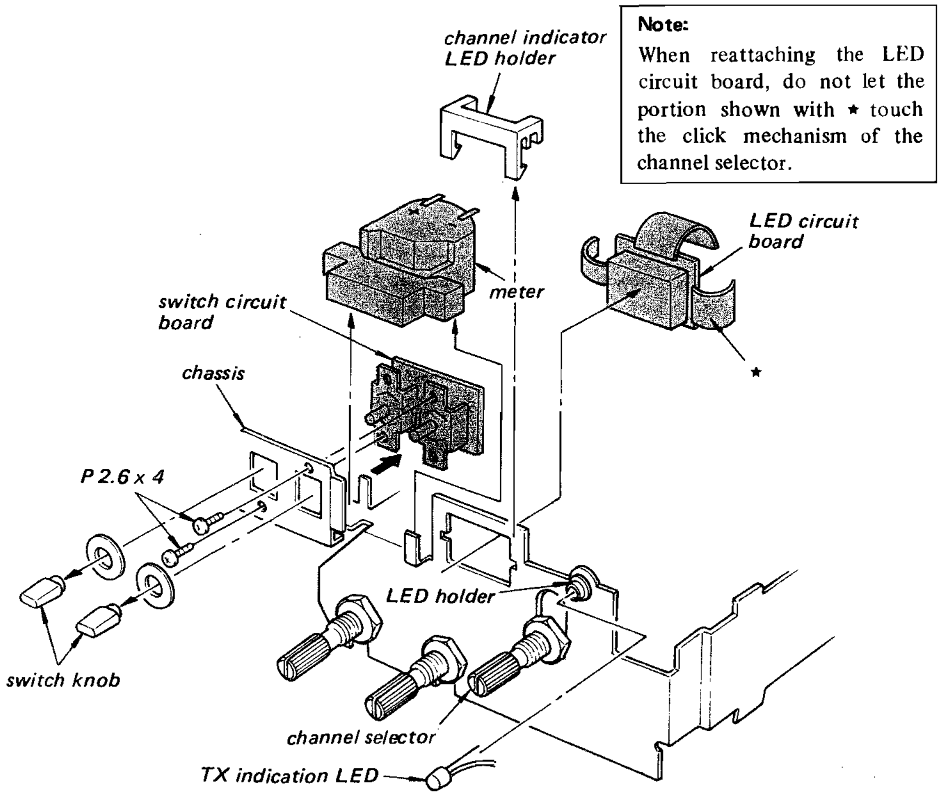
SYNTHESIZER BLOCK REMOVAL

Note: The synthesizer board can be repaired. However, the conductor side of the board is not accesible during a check because of the shield case A.


shield case A cover
PS 3 x 6
synthesizer circuit board
PS 3 x 6
PS 3 x 6
shield case A
PS 3 x 6 (through circuit board)

SWITCH BOARD, LED BOARD and METER REMOVAL

Note:
When reattaching the LED circuit board, do not let the portion shown with ⭑ touch the click mechanism of the channel selector.


channel indicator LED holder
LED circuit board
meter
switch circuit board
⭑
chassis
P 2.6 x 4
LED holder
switch knob
channel selector
TX indication LED

SECTION 3

ADJUSTMENTS

Setting:

Unless otherwise specified, set the switches and controls as follows.

POWER switch:	ON
Channel selector:	18
EMERGENCY CH switch:	OFF
CB/PA switch:	CB
DX/LOCAL switch:	DX
RFO/SWR switch:	RFO
VOLUME control:	maximum
SQUELCH control:	fully counterclockwise
Transmit/receive:	receive
Power supply voltage:	13.8 V dc

Test Equipment Required:

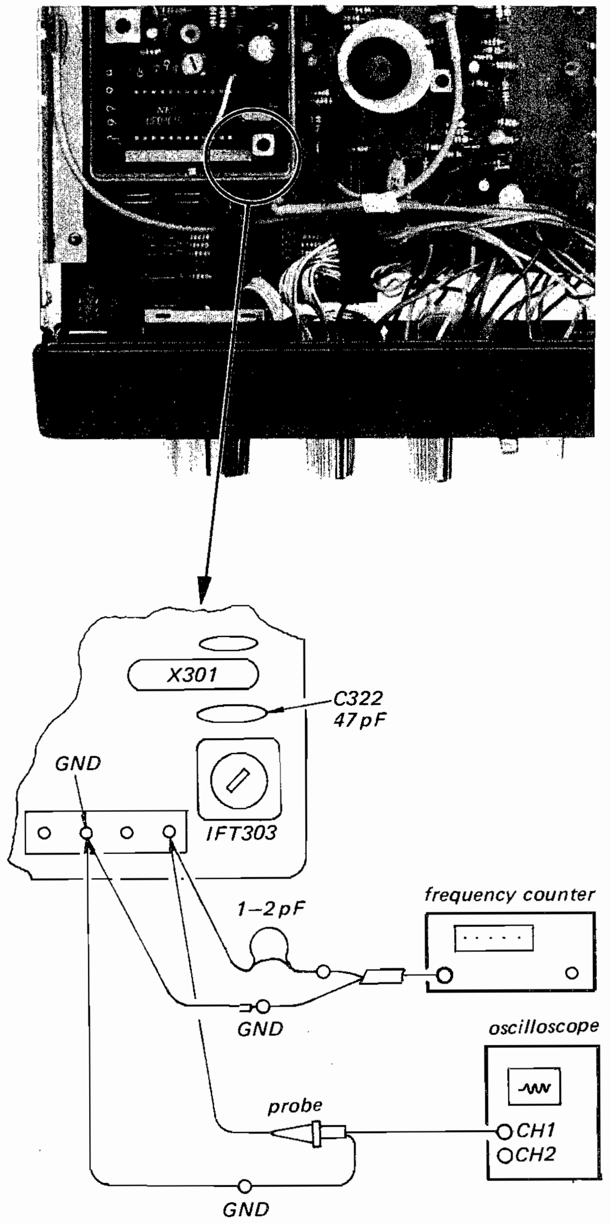
- Rf signal generator (AM)
- Regulated dc power supply (13.8 V, 3 A)
- Rf dummy load (non-inductive 50 Ω, more than 10 W)
- Oscilloscope (30 MHz, with triggered CH1 only provision)
- Sweep generator (30 MHz)
- In-line rf power/SWR meter (50 Ω, more than 10 W, up to 50 MHz)
- Frequency counter (30 MHz, sensitivity 50 mV)
- Audio signal generator (with attenuator down to 60 dB)
- Audio millivoltmeter
- Coaxial cable assemblies (50 Ω, less than one foot, fitted with plugs)

Note on Adjustment

1. TX means transmitter
   RX means receiver
2. Unless otherwise specified, input levels are to be as low as possible for the adjustments.
3. The maximum current drain in transmitting is about 1 A. A regulated dc power supply of 1 A is insufficient. Use a power supply of 2 A or more.
4. The coaxial cables used for connecting the ANT connector and the rf power meter, and the rf power meter to the dummy load are to be as short as possible. If the cables are long, SWR indication differs from the true value due to the cable loss.
5. It is preferable to use a low-capacitive probe with the frequency counter not to interrupt the circuit connected. If such a probe is not available, precisely follow the procedure in this manual.

Synthesizer 10.24 MHz Adjustment

Procedure:

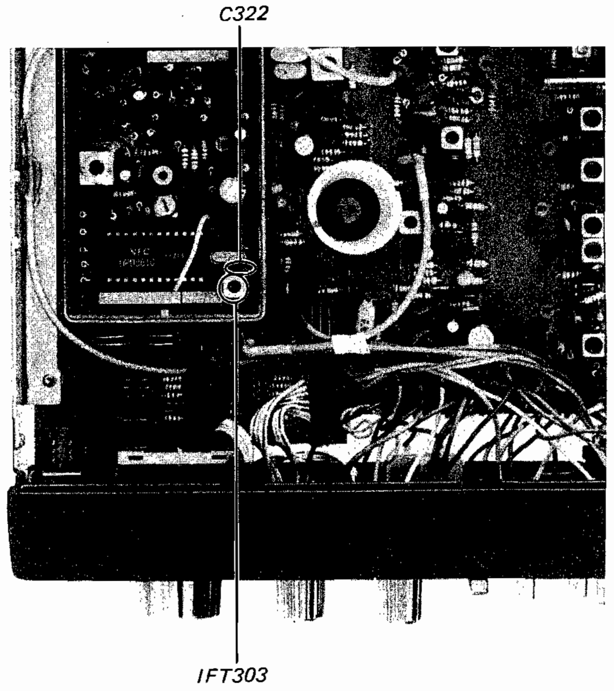


1. Adjust C322 for a 10.24 MHz ± 100 Hz reading on the frequency counter.

Value of C322	Frequency
small	up
↕	↕
large	down

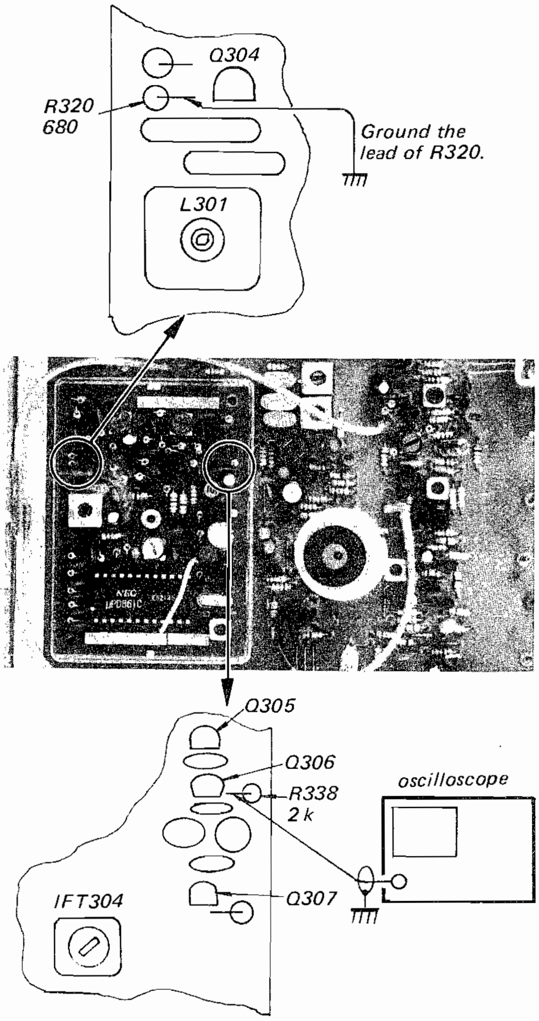
2. Adjust IFT303 for a maximum reading on the oscilloscope.

Adjustment Location:
– synthesizer board –



Synthesizer Tripler Adjustment

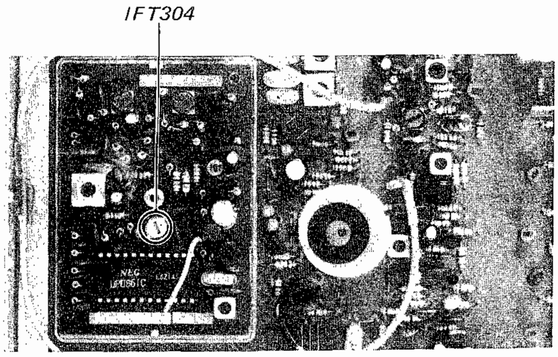
Procedure:


Q304
R320
680
Ground the
lead of R320.
L301
Q305
Q306
R338
2 k
oscilloscope
IFT304
Q307

Adjust IFT304 for a maximum waveform reading (15.36 MHz) on the oscilloscope.

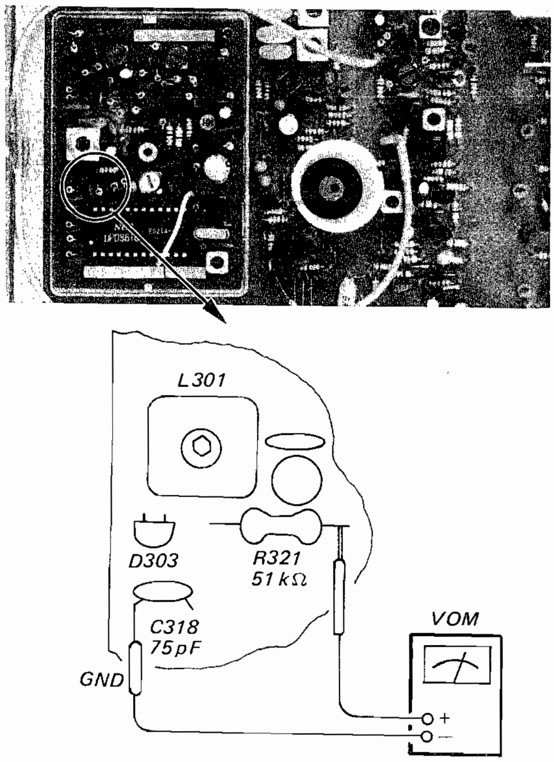
Adjustment Location:

– synthesizer board –



Synthesizer VCO Adjustment

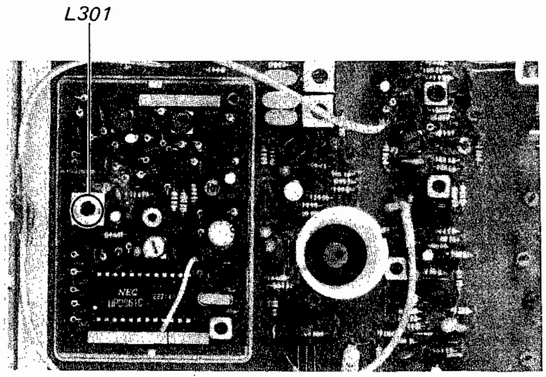
Procedure:


L301
D303
R321
51 kΩ
C318
75pF
GND
VOM
+
–

1. Channel selector: 1
   Adjust L301 using a plastic hexagonal screwdriver for a 1 V dc reading on the VOM.
2. Change the channel selector from 1 through 40. VOM reading should gradually change from 1 V (channel 1) to 3.4 V (channel 40).

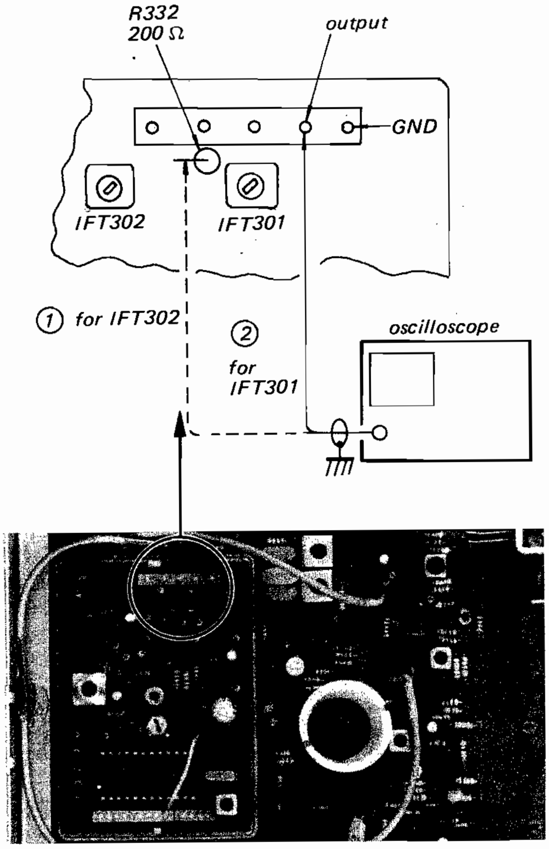
Adjustment Location:

-- synthesizer board –



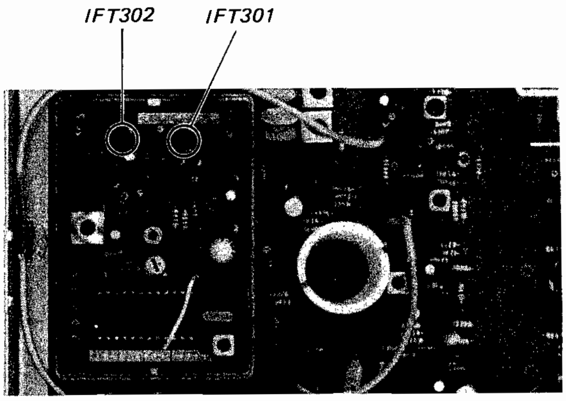
Synthesizer PLL Output Adjustment

Procedure:


R332
200 Ω
output
GND
IFT302
IFT301
① for IFT302
② for IFT301
oscilloscope

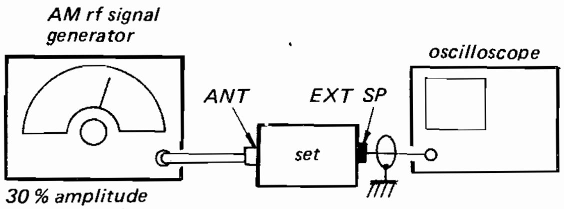
1. Adjust IFT302 for a maximum waveform reading on the oscilloscope at R332.
2. Adjust IFT301 for a maximum waveform reading on the oscilloscope at the output terminal.

Adjustment Location:
– synthesizer board –


IFT302
IFT301

RX Ant, Rf and 1st IF Adjustment

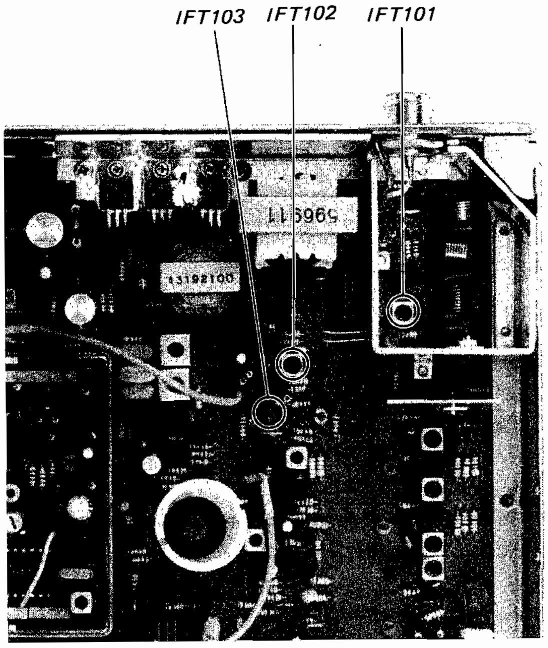
Procedure:


AM rf signal generator
ANT
EXT SP
set
oscilloscope

30 % amplitude modulation by 1 kHz signal
frequency: 27.175 MHz
generator output: about 3.2 μV (–10 dB)

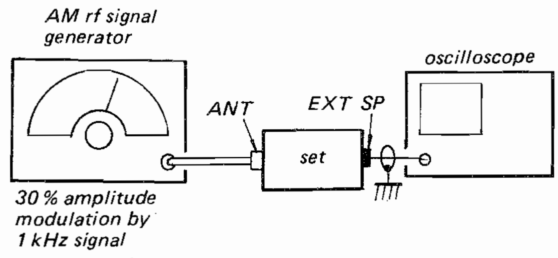
Adjust IFT101, IFT102 and IFT103 for a maximum waveform reading on the oscilloscope.

Adjustment Location:
– main board –


IFT103
IFT102
IFT101

RX 2nd IF Adjustment

Procedure:


AM rf signal generator
oscilloscope
ANT
EXT SP
set
30 % amplitude modulation by 1 kHz signal
frequency: 27.175 MHz

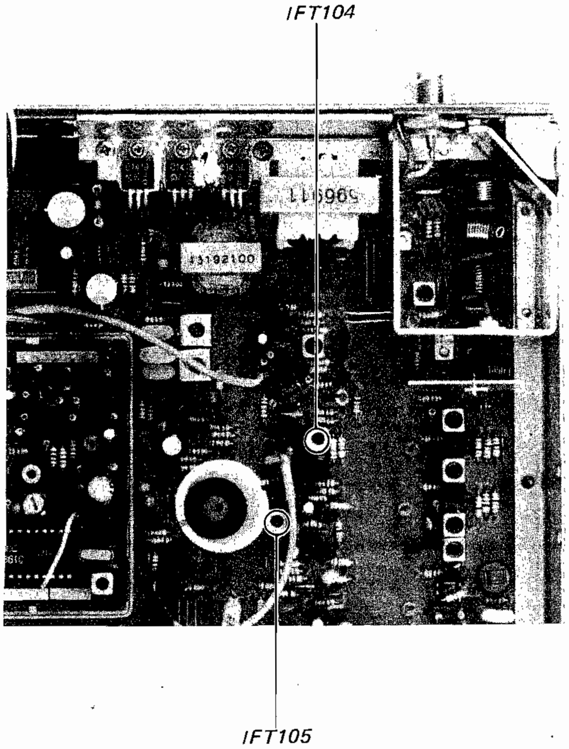
[redacted]

generator output: about 3.2 μV (–10 dB)

Adjust IFT104 and IFT105 for a maximum reading on the oscilloscope.

Adjustment Location:

– main board –


IFT104
IFT105

SQUELCH Adjustment

Setting:

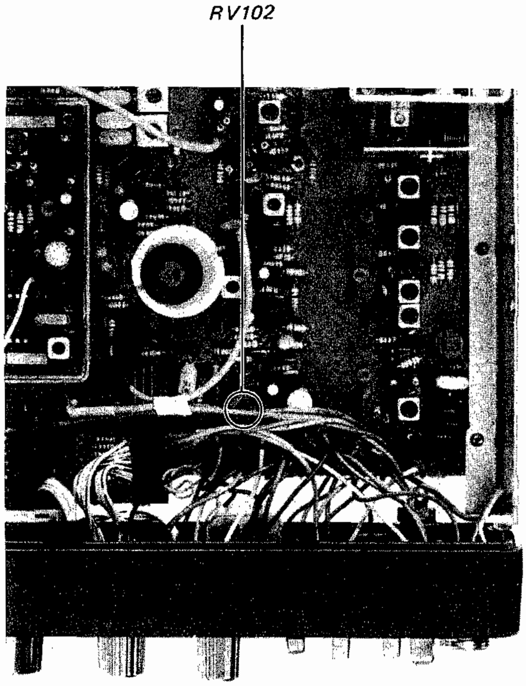
SQUELCH control: center of rotation
VOLUME control: maximum

Procedure:

1. Adjust RV102 to the point where the noise output from the speaker just disappears.
2. Turn SQUELCH control from minimum to maximum and check that squelch operates and noise disappears at the center of SQUELCH control rotation.

Adjustment Location:

– main board –

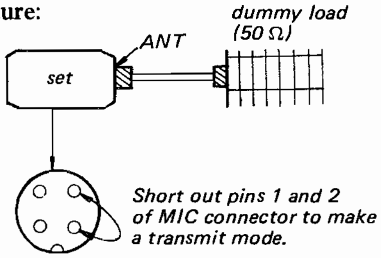


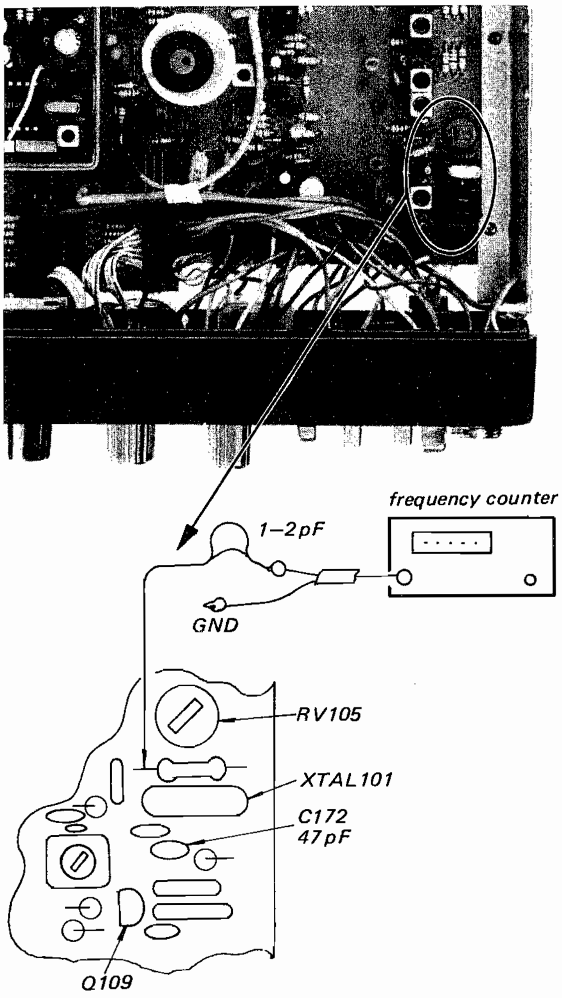
TX 10.695 MHz Osc Adjustment

Setting:

transmit/receive: transmit

Procedure:


dummy load
(50 Ω)
ANT
set
Short out pins 1 and 2
of MIC connector to make
a transmit mode.


frequency counter
1–2pF
GND
RV105
XTAL101
C172
47pF
Q109

Adjust C172 for a 10.695 MHz ± 100 Hz reading on the frequency counter.

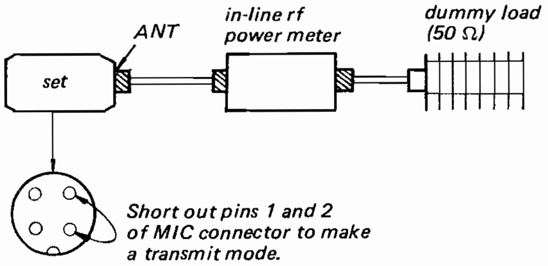
Value of C172	Frequency
small ↕ large	up ↕ down

TX Mix Input Coil Adjustment

Setting:

transmit/receive: transmit

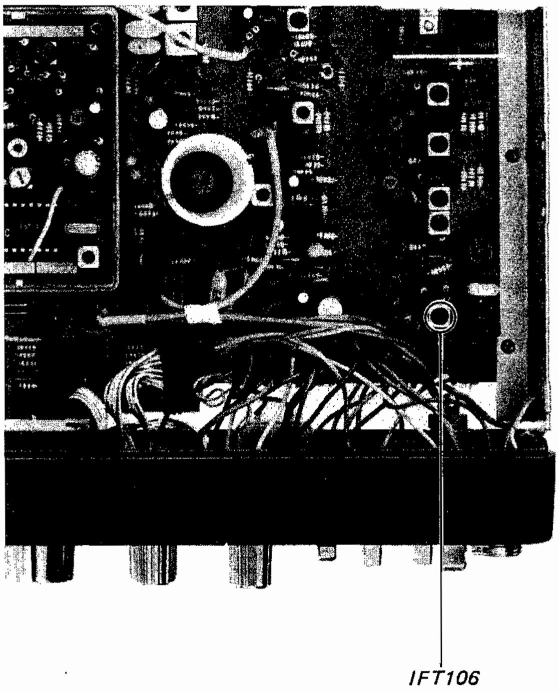
Procedure:


ANT
in-line rf
power meter
dummy load
(50 Ω)
set
Short out pins 1 and 2
of MIC connector to make
a transmit mode.

Adjust IFT106 for a maximum reading on the power meter.

Adjustment Location:

– main board –

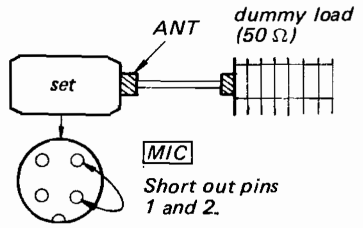


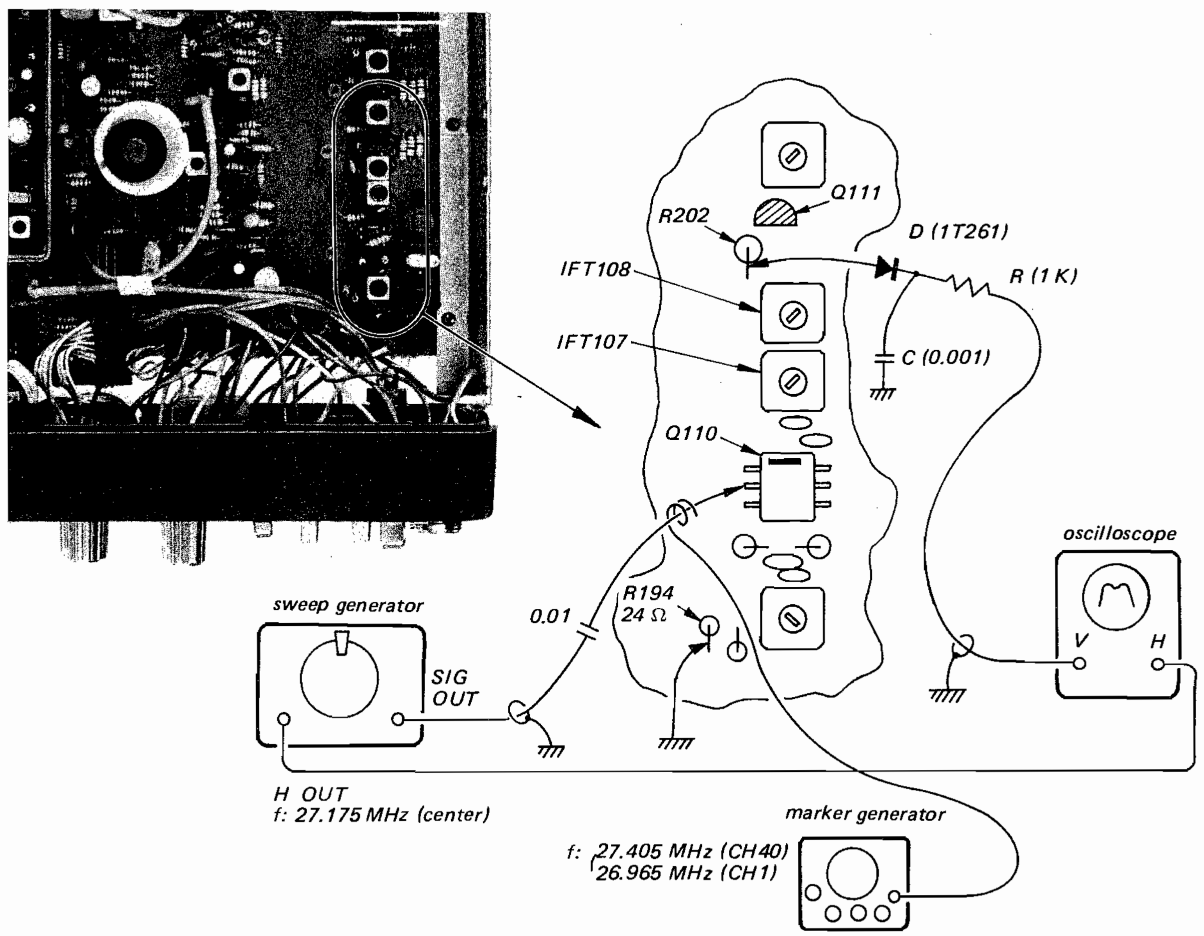
TX 27 MHz Transformer Adjustment

Setting:

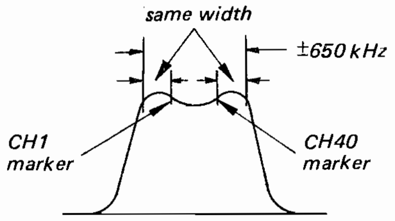
transmit/receive: transmit

Procedure:


ANT
dummy load (50 Ω)
set
MIC
Short out pins 1 and 2.


Q111
R202
D (1T261)
R (1K)
IFT108
IFT107
C (0.001)
Q110
oscilloscope
V
H
sweep generator
0.01
R194
24 Ω
SIG OUT
H OUT
f: 27.175 MHz (center)
marker generator
f: 27.405 MHz (CH40)
26.965 MHz (CH1)

Adjust IFT107 and IFT108 for a waveform on the oscilloscope as shown below.

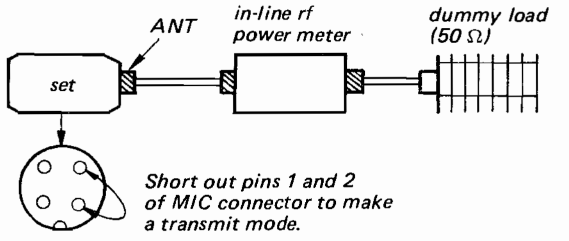

same width
±650 kHz
CH1 marker
CH40 marker

TX CW Output Adjustment

Setting:

transmit/receive: transmit

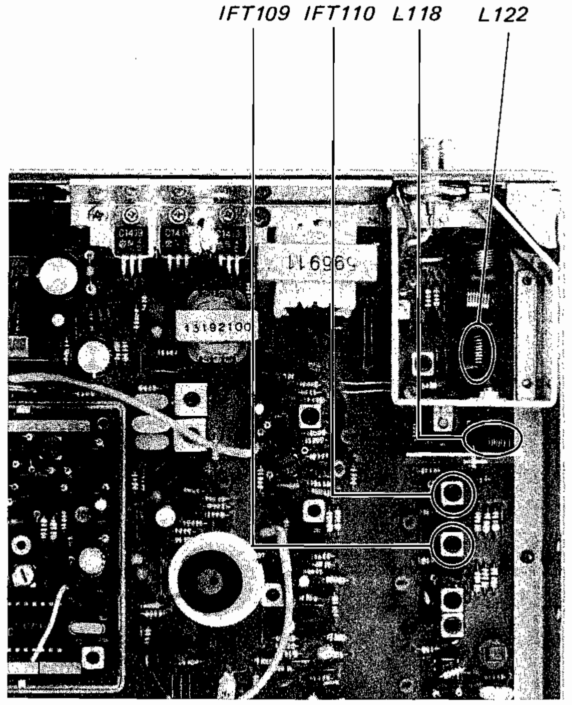
Procedure:


ANT
in-line rf power meter
dummy load (50 Ω)
set
Short out pins 1 and 2 of MIC connector to make a transmit mode.

1. Adjust IFT109, IFT110 and the pitch of L118 for a maximum reading on the power meter.
2. Adjust the pitch of L122 for a 3.5 W ±0.5 W reading on the rf power meter.

Adjustment Location:

– main board –

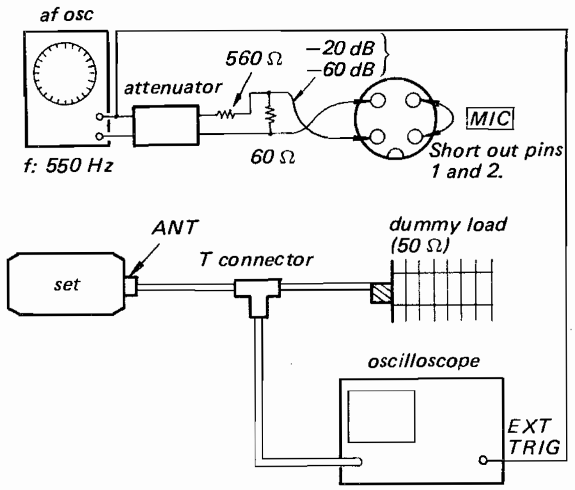

IFT109
IFT110
L118
L122

TX Modulation Adjustment

Setting:

transmit/receive: transmit

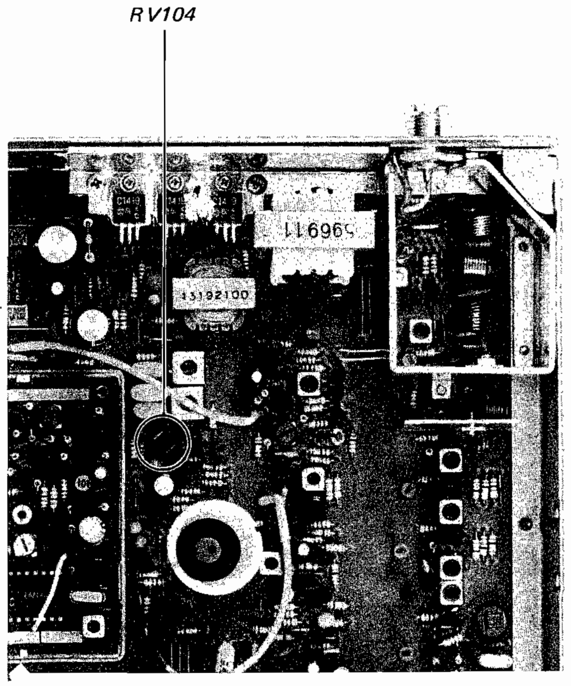
Procedure:


af osc
560 Ω
–20 dB
–60 dB
attenuator
MIC
60 Ω
Short out pins 1 and 2.
f: 550 Hz
ANT
T connector
dummy load (50 Ω)
set
oscilloscope
EXT TRIG

1. Audio input to MIC: –20 dB
   Adjust RV104 for a 100%-modulation reading on the oscilloscope.
2. Audio input to MIC: –60 dB
   The modulation reading on the oscilloscope should be about 50%.

Adjustment Location:

– main board –

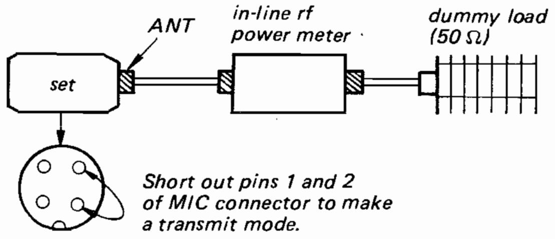


TX CW Output Adjustment

Setting:

transmit/receive: transmit

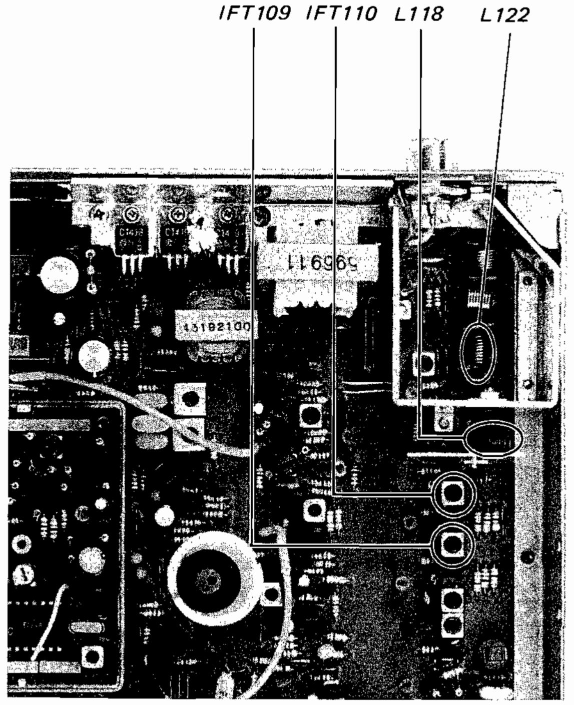
Procedure:


ANT
in-line rf power meter
dummy load (50 Ω)
set
Short out pins 1 and 2 of MIC connector to make a transmit mode.

1. Adjust IFT109, IFT110 and the pitch of L118 for a maximum reading on the power meter.
2. Adjust the pitch of L122 for a 3.5 W ±0.5 W reading on the rf power meter.

Adjustment Location:

– main board –

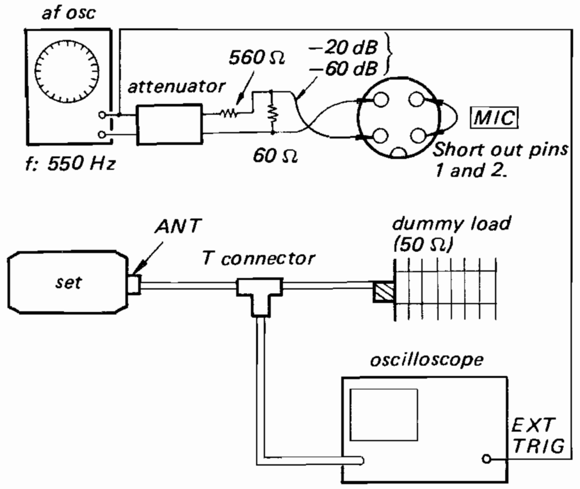

IFT109
IFT110
L118
L122

TX Modulation Adjustment

Setting:

transmit/receive: transmit

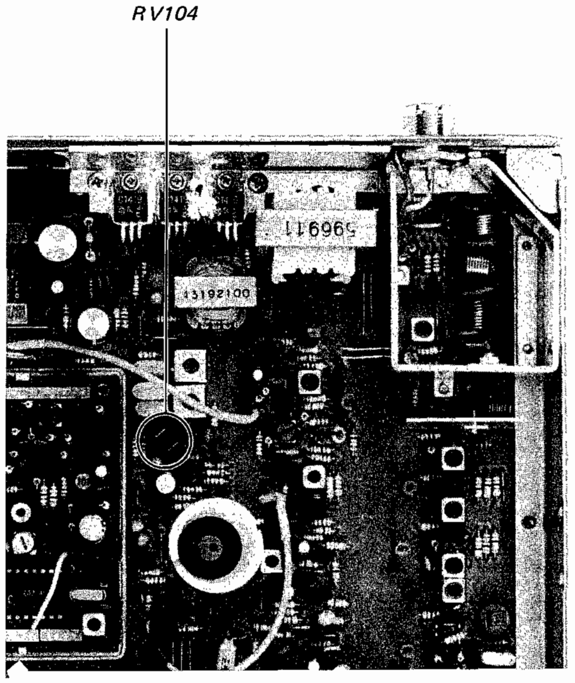
Procedure:


af osc
f: 550 Hz
attenuator
560 Ω
60 Ω
–20 dB
–60 dB
MIC
Short out pins 1 and 2.
ANT
T connector
dummy load (50 Ω)
set
oscilloscope
EXT TRIG

1. Audio input to MIC: –20 dB
   Adjust RV104 for a 100%-modulation reading on the oscilloscope.
2. Audio input to MIC: –60 dB
   The modulation reading on the oscilloscope should be about 50%.

Adjustment Location:

– main board –

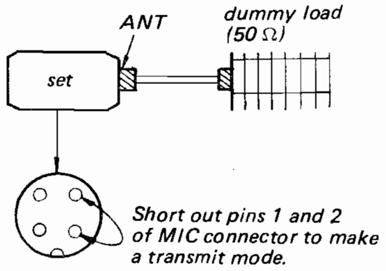


RFO Meter Adjustment

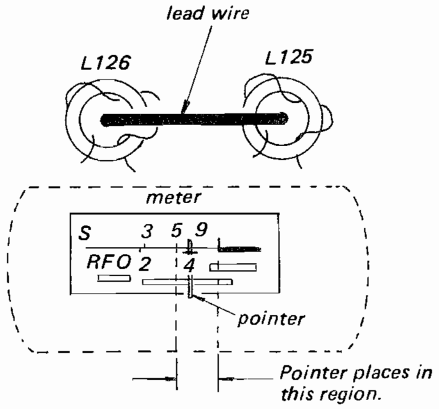
Setting:

transmit/receive: transmit

Procedure:

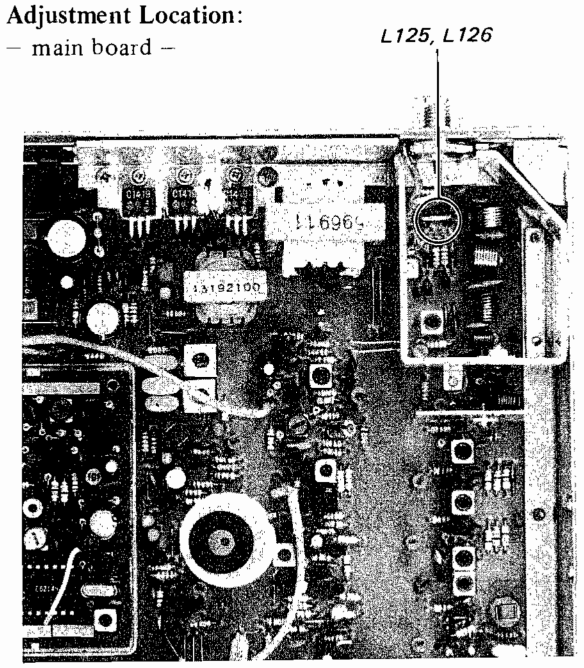

ANT
dummy load (50 Ω)
set
Short out pins 1 and 2 of MIC connector to make a transmit mode.

Adjust the position of the coupling lead wire by moving it in the coils L125 and L126 for an RFO meter reading shown below.


lead wire
L126
L125
meter
S 3 5 9
RFO 2 4
pointer
Pointer places in this region.

Adjustment Location:

– main board –



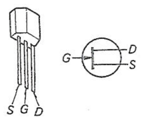
SECTION 4
DIAGRAMS

4-1. MOUNTING DIAGRAM

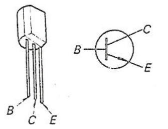
Replacement Semiconductors

For replacement, use semiconductors except in (   ).

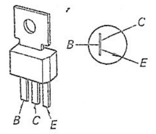
Q101: 2SK23A-824 (2SK23A)



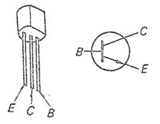
Q103 – 106, 109, Q111, 301, 303, Q305 – 307 } 2SC710
Q773: 2SC773



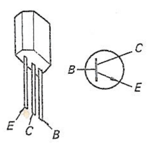
Q113: 2SC1760



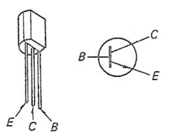
Q120, 308: 2SC1474



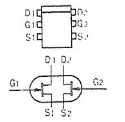
Q102, 107, 108 Q115 – 119, 304 : 2SC634A



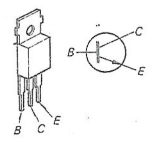
(2SC1363)



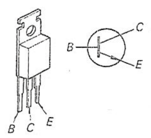
Q110: 2SK58


D1
G1
S1
D2
G2
S2
D1 D2
G1
G2
S1 S2

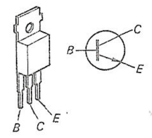
Q114: 2SC1816



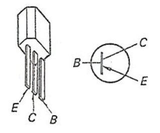
Q121, 122 Q125 : 2SC1061



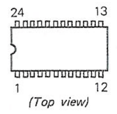
(2SC1419)



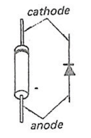
Q123, 124 Q302 : 2SA678



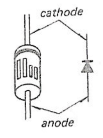
IC301: μPD861C


24
13
1
12
(Top view)

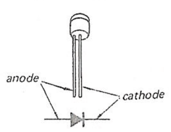
D101 – 106, 108 – 110, D113, 115, 116, 118, 119, D124 – 134, 301, 302, 304 } 1S1555
D111, 120: 1T22A (1T23)
D112, 122: 10E2
D114: 1T261 (1T262)
D303: FC52C (FC52M)


cathode
anode

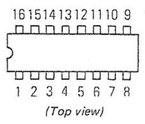
D121: EQB01-11Z (AW01-11)


cathode
anode

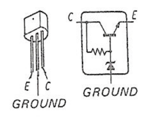
D135: TLR109


anode
cathode

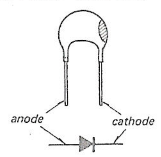
IC101: MSM561


16 15 14 13 12 11 10 9
1 2 3 4 5 6 7 8
(Top view)

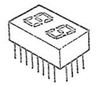
IC302: μA78L05AV


C
E
E C
GROUND
GROUND

D107: VD1222
D117: VD1120 (MV5L)


anode
cathode

D123: SL1272



Note: (for schematic diagram)

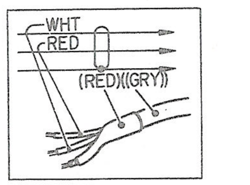
- All capacitors are in μF unless otherwise noted. pF = μμF 50 WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000 Ω, MΩ = 1000 kΩ
- △ : internal component.
- ※ : selected to yield optimum performance.
- ▨ : B+ bus.
- ▭ : panel designation.
- ⬚ : adjustment for repair.
- ⏚ : direct connection to chassis.
- ⏚ : connected to ⊖ terminal of car battery.
- RX: Receiving
- TX: Transmitting
- Readings are taken with a VOM (20 kΩ/V) in channel 18.
  no mark: RX ( ) : TX
  [ ] : PA (S2 is PA and Transmitting Button is pushed.)
- Signal waveforms are taken under the following condition.
  Channel: 18 no parentheses: RX
  ( ) MOD: When 1 kHz (−6 dB) signal is applied at microphone input in TX mode.
  ( ) : Mode . . . TX with no modulation
- Frequency of signal in the synthesizer board is deviated by selecting the channel.
- Voltage variations may be noted due to normal production tolerances.

- Switch

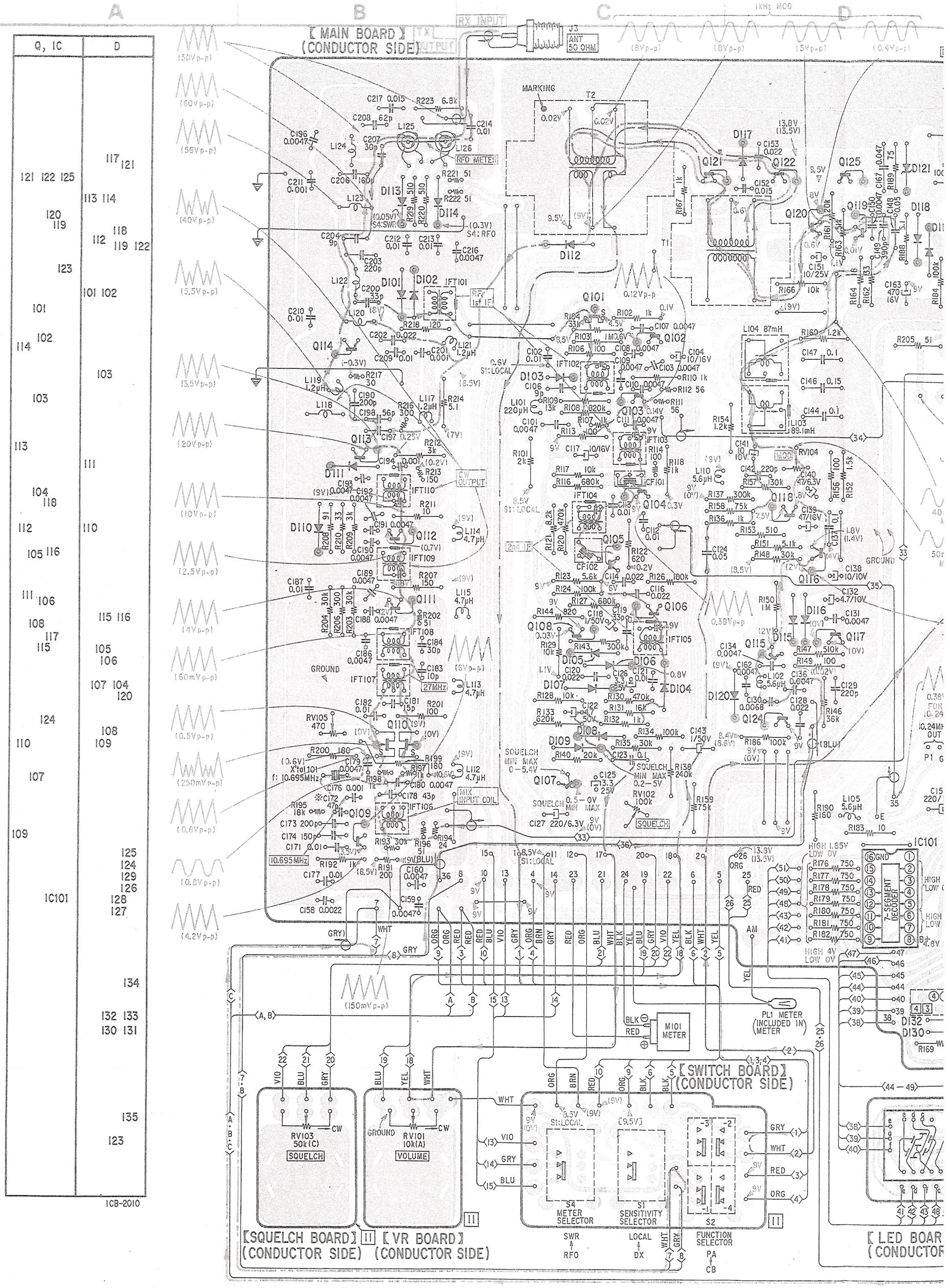
Ref. No.	Switch	Position
S1	SENSITIVITY SELECTOR	DX
S2-1 to 4	FUNCTION SELECTOR	CB
S3-1, 2	EMERGENCY CH	OFF
S4	METER SELECTOR	RFO
S5-1 to 8	CHANNEL	21
S6	POWER	OFF

Note:

- Color code of sleeving over the end of the jacket.


WHT
RED
(RED)
(GRY)

- ⬚← : indicates side identified with part number.
- ▨ : B+ pattern
- Signal path
  - : TX AF/MOD
  - : TX CARRIER (LOCAL OSC)
  - : TX COMMON
  - : RX COMMON
  - : RX LOCAL OSC


A
B
C
D
1
2
3
4
5
Q, IC
D
[MAIN BOARD] (CONDUCTOR SIDE)
RX INPUT
TX OUTPUT
ANT 50 OHM
J3
MARKING
T2
T1
RFO METER
IFT101
IFT102
IFT103
IFT104
IFT105
IFT106
IFT107
IFT108
IFT109
IFT110
CFI01
CF102
X'tal 101 f: 10.695MHz
10.695MHz
27MHz
SQUELCH MIN MAX
GROUND
RV105 470
RV104
IC101
7 SEGMENT DECODER
PL1 METER (INCLUDED IN METER)
M101 METER
[SWITCH BOARD] (CONDUCTOR SIDE)
[SQUELCH BOARD] (CONDUCTOR SIDE)
[VR BOARD] (CONDUCTOR SIDE)
[LED BOARD] (CONDUCTOR
RV103 50k(C) SQUELCH
RV101 10k(A) VOLUME
S4 METER SELECTOR SWR RFO
S1 SENSITIVITY SELECTOR LOCAL DX
S2 FUNCTION SELECTOR PA CB
ICB-2010

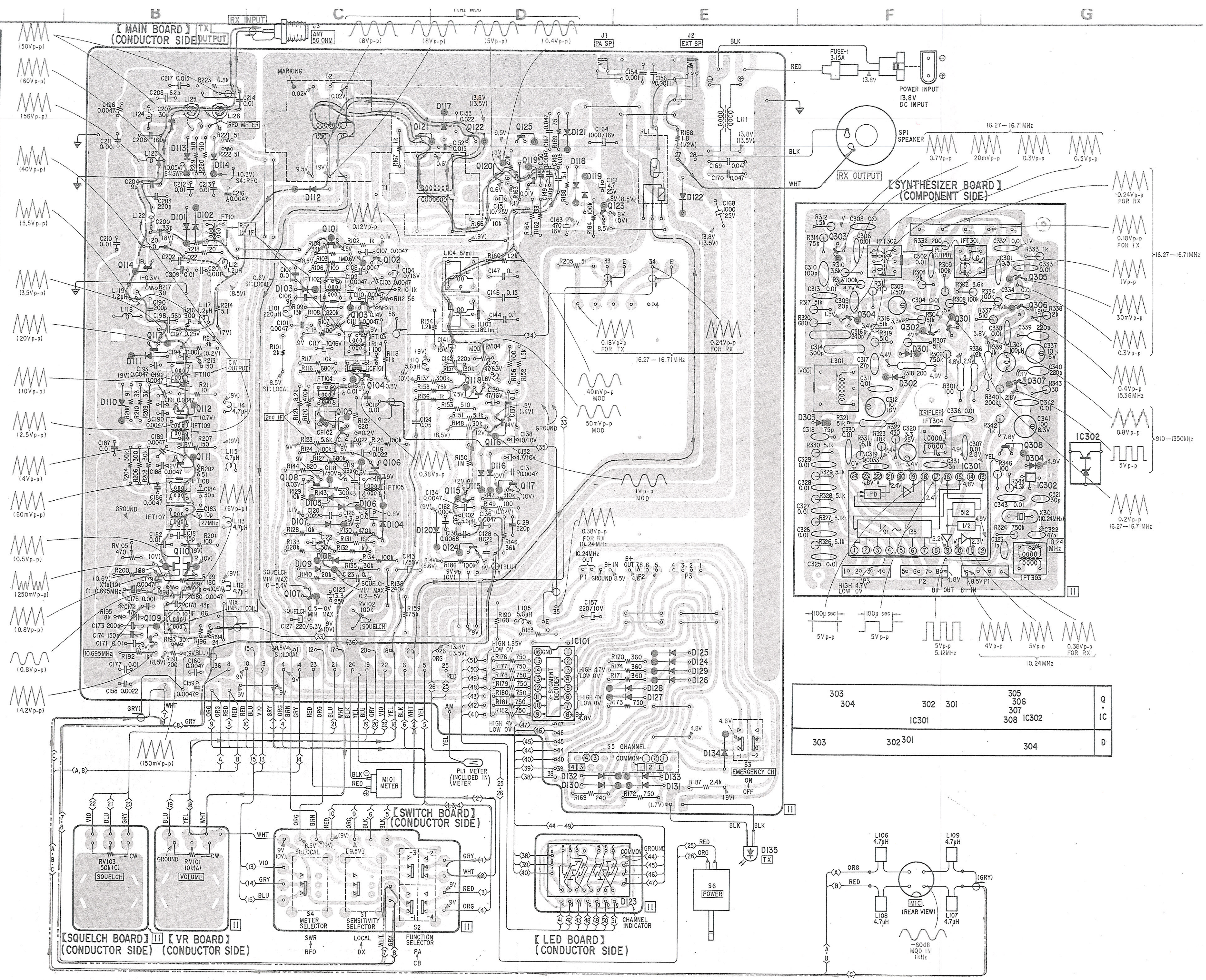
19)

R109

cathode

	Q, IC	D
1	121 122 125 120 119 123	117 121 113 114 112 118 119 122
2	101 114 102 103 113 104 118	101 102 103 111
3	112 105 116 111 106 108 117 115 124 110	110 115 116 105 106 107 104 120 108 109
4	107 109 IC101	125 124 129 126 128 127 134
5		132 133 130 131 135 123

ICB-2010



A B C D E F G
1 2 3 4 5
【MAIN BOARD】(CONDUCTOR SIDE)
RX INPUT
TX OUTPUT
J3 ANT 50 OHM
J1 PA SP
J2 EXT SP
FUSE-1 3.15A
POWER INPUT 13.8V DC INPUT
SP1 SPEAKER
RX OUTPUT
16.27—16.71MHz
【SYNTHESIZER BOARD】(COMPONENT SIDE)
0.24Vp-p FOR RX
0.18Vp-p FOR TX
IC302
910—1350kHz
10.24MHz
S5 CHANNEL
S3 EMERGENCY CH
D135 TX
M101 METER
PL1 METER (INCLUDED IN METER)
【SWITCH BOARD】(CONDUCTOR SIDE)
S4 METER SELECTOR
S1 SENSITIVITY SELECTOR
S2 FUNCTION SELECTOR
SWR RFO
LOCAL DX
PA CB
【SQUELCH BOARD】(CONDUCTOR SIDE)
RV103 50k(C) SQUELCH
【VR BOARD】(CONDUCTOR SIDE)
RV101 10k(A) VOLUME
【LED BOARD】(CONDUCTOR SIDE)
D123 CHANNEL INDICATOR
S6 POWER
MIC (REAR VIEW)
-60dB MOD IN 1kHz
L106 4.7μH
L109 4.7μH
L108 4.7μH
L107 4.7μH

303 304 302 301 IC301 305 306 307 308 IC302	Q·IC
303 302 301 304	D

4-2. SCHEMATIC DIAGRAM

Note:

- All capacitors are in μF unless otherwise noted. pF = μμF 50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ = 1000 Ω, MΩ = 1000 kΩ
- △ : internal component.
- ※ : selected to yield optimum performance.
- ▬ : B+ bus.
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- ☐ : adjustment for repair.
- ⏚ : direct connection to chassis.
- ⏚ : connected to ⊖ terminal of car battery.
- RX: Receiving
- TX: Transmitting
- Readings are taken with a VOM (20 kΩ/V) in channel 18.
  no mark: RX ( ) : TX
  [ ] : PA (S2 is PA and Transmitting Button is pushed.)

- Signal waveforms are taken under the following condition.
  Channel: 18 no parentheses: RX
  ( ) MOD: When 1 kHz (−6 dB) signal is applied at microphone input in TX mode.
  ( ) : Mode . . . TX with no modulation
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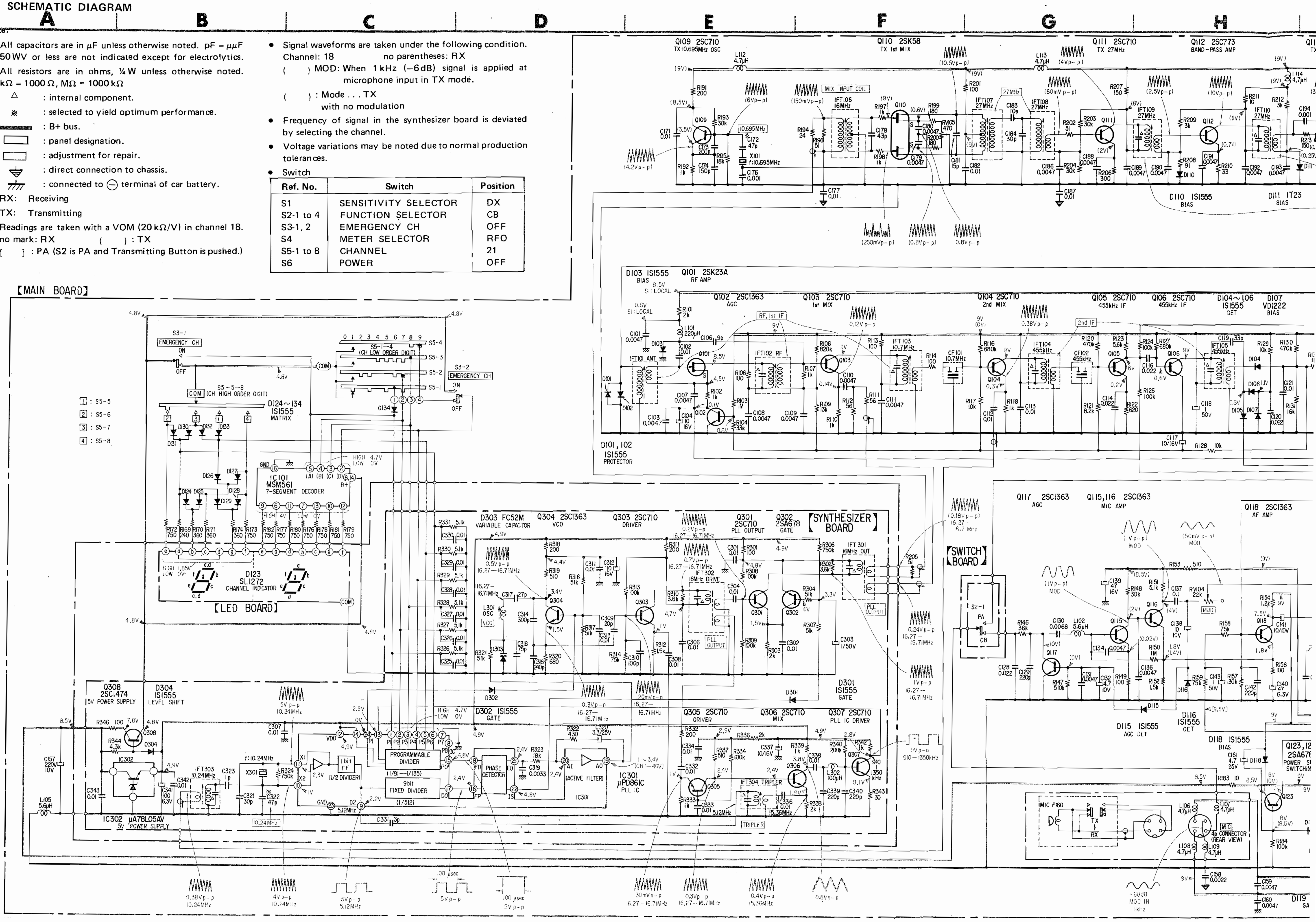
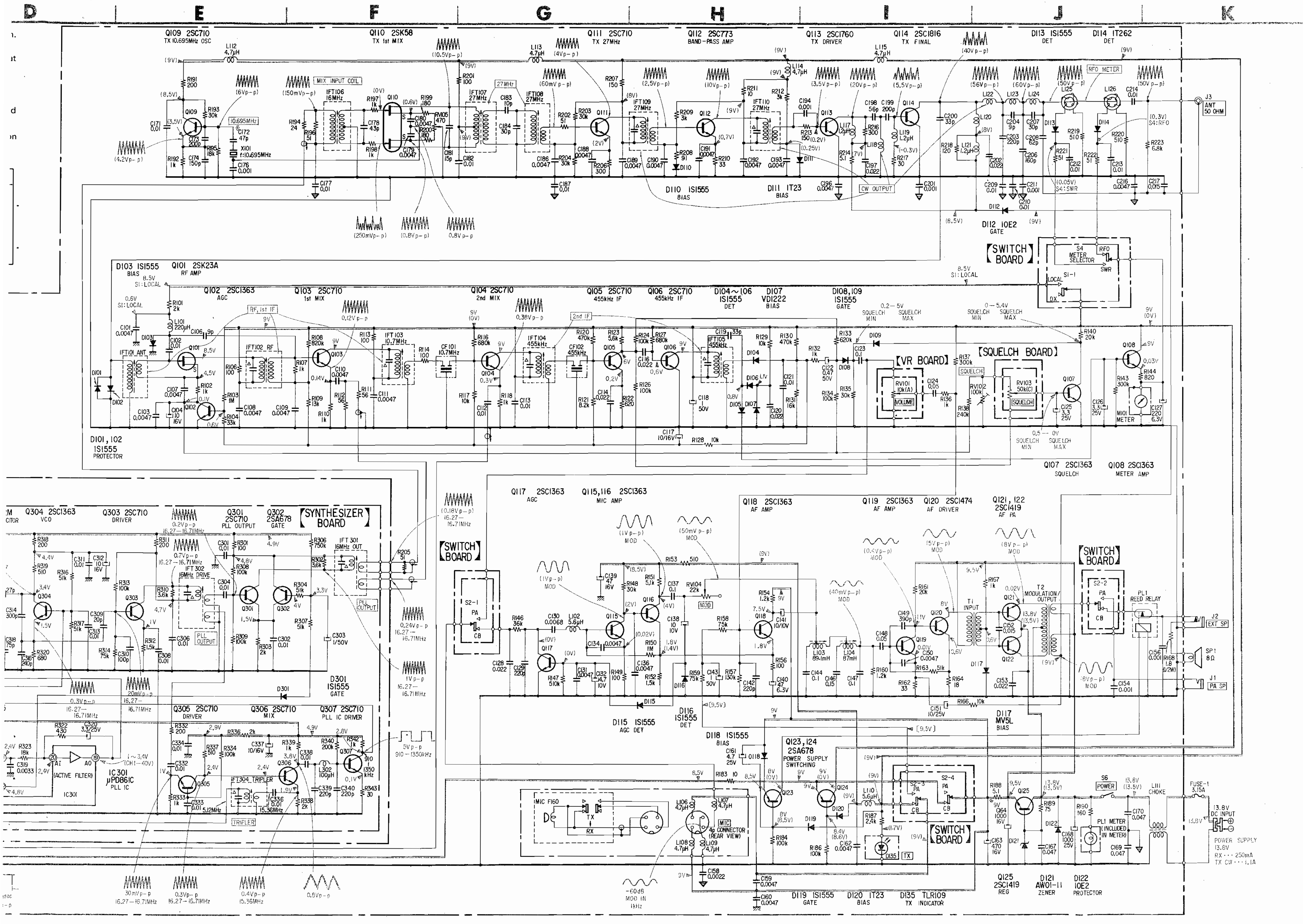
- Switch

Ref. No.	Switch	Position
S1	SENSITIVITY SELECTOR	DX
S2-1 to 4	FUNCTION SELECTOR	CB
S3-1, 2	EMERGENCY CH	OFF
S4	METER SELECTOR	RFO
S5-1 to 8	CHANNEL	21
S6	POWER	OFF



A
B
C
D
E
F
G
H
1
2
3
4
5
【MAIN BOARD】
【LED BOARD】
【SYNTHESIZER BOARD】
【SWITCH BOARD】
Q109 2SC710 TX 10.695MHz OSC
Q110 2SK58 TX 1st MIX
Q111 2SC710 TX 27MHz
Q112 2SC773 BAND-PASS AMP
D110 1S1555 BIAS
D111 1T23 BIAS
D103 1S1555 BIAS
Q101 2SK23A RF AMP
Q102 2SC1363 AGC
Q103 2SC710 1st MIX
Q104 2SC710 2nd MIX
Q105 2SC710 455kHz IF
Q106 2SC710 455kHz IF
D104~106 1S1555 DET
D107 VD1222 BIAS
D101, 102 1S1555 PROTECTOR
S3-1 EMERGENCY CH
S3-2 EMERGENCY CH
S5-5~8 (CH HIGH ORDER DIGIT)
S5-1~4 (CH LOW ORDER DIGIT)
D124~134 1S1555 MATRIX
IC101 MSM561 7-SEGMENT DECODER
D123 SL1272 CHANNEL INDICATOR
1 : S5-5
2 : S5-6
3 : S5-7
4 : S5-8
D303 FC52M VARIABLE CAPACITOR
Q304 2SC1363 VCO
Q303 2SC710 DRIVER
Q301 2SC710 PLL OUTPUT
Q302 2SA678 GATE
D301 1S1555 GATE
Q308 2SC1474 5V POWER SUPPLY
D304 1S1555 LEVEL SHIFT
IC302 μA78L05AV 5V POWER SUPPLY
IC301 μPD861C PLL IC
PROGRAMMABLE DIVIDER (1/91~1/135)
9bit FIXED DIVIDER (1/512)
1bit FF (1/2 DIVIDER)
PHASE DETECTOR
(ACTIVE FILTER)
D302 1S1555 GATE
Q305 2SC710 DRIVER
Q306 2SC710 MIX
Q307 2SC710 PLL IC DRIVER
IFT304 TRIPLER
X301 f:10.24MHz
X101 f:10.695MHz
Q117 2SC1363 AGC
Q115,116 2SC1363 MIC AMP
Q118 2SC1363 AF AMP
D115 1S1555 AGC DET
D116 1S1555 DET
D118 1S1555 BIAS
MIC F160
4p CONNECTOR (REAR VIEW)
S2-1 PA CB
-60dB MOD IN 1kHz

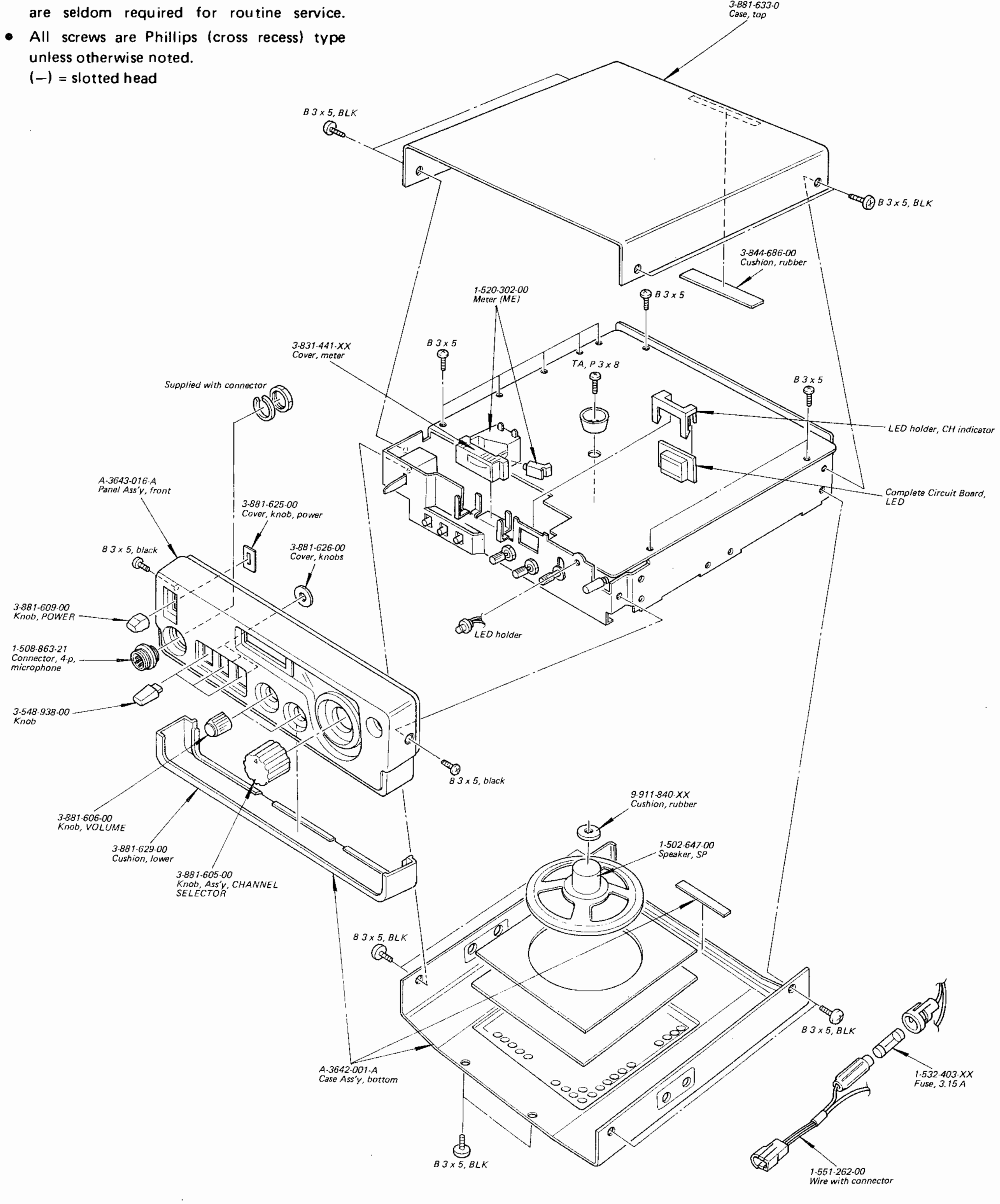

D
E
F
G
H
I
J
K
Q109 2SC710 TX 10.695MHz OSC
Q110 2SK58 TX 1st MIX
Q111 2SC710 TX 27MHz
Q112 2SC773 BAND-PASS AMP
Q113 2SC1760 TX DRIVER
Q114 2SC1816 TX FINAL
D113 1S1555 DET
D114 1T262 DET
MIX INPUT COIL
RFO METER
J3 ANT 50 OHM
D110 1S1555 BIAS
D111 1T23 BIAS
CW OUTPUT
D112 10E2 GATE
SWITCH BOARD
S4 METER SELECTOR
RFO
SWR
S1-1 LOCAL DX
D103 1S1555 BIAS
Q101 2SK23A RF AMP
Q102 2SC1363 AGC
Q103 2SC710 1st MIX
Q104 2SC710 2nd MIX
Q105 2SC710 455kHz IF
Q106 2SC710 455kHz IF
D104~106 1S1555 DET
D107 VD1222 BIAS
D108,109 1S1555 GATE
RF, 1st IF
2nd IF
IFT101 ANT
IFT102 RF
IFT103 10.7MHz
CF101 10.7MHz
IFT104 455kHz
CF102 455kHz
IFT105 455kHz
D101,102 1S1555 PROTECTOR
VR BOARD
RV101 10k(A) VOLUME
SQUELCH BOARD
RV103 50k(C) SQUELCH
Q107 2SC1363 SQUELCH
Q108 2SC1363 METER AMP
M101 METER
Q304 2SC1363 VCO
Q303 2SC710 DRIVER
Q301 2SC710 PLL OUTPUT
Q302 2SA678 GATE
SYNTHESIZER BOARD
IFT301 16MHz OUT
IFT302 16MHz DRIVE
PLL OUTPUT
D301 1S1555 GATE
Q305 2SC710 DRIVER
Q306 2SC710 MIX
Q307 2SC710 PLL IC DRIVER
IC301 μPD861C PLL IC
ACTIVE FILTER
IFT304 TRIPLER
TRIPLER
Q117 2SC1363 AGC
Q115,116 2SC1363 MIC AMP
Q118 2SC1363 AF AMP
Q119 2SC1363 AF AMP
Q120 2SC1474 AF DRIVER
Q121,122 2SC1419 AF PA
S2-1 PA CB
S2-2 PA CB
T1 INPUT
T2 MODULATION/OUTPUT
PL1 REED RELAY
J2 EXT SP
SP1 8Ω
J1 PA SP
D115 1S1555 AGC DET
D116 1S1555 DET
D117 MV5L BIAS
D118 1S1555 BIAS
Q123,124 2SA678 POWER SUPPLY SWITCHING
MIC F160
TX
RX
MIC 4p CONNECTOR (REAR VIEW)
-60dB MOD IN 1kHz
S2-3 PA CB
S2-4 PA CB
D135 TX
Q125 2SC1419 REG
D121 AW01-11 ZENER
D122 10E2 PROTECTOR
D119 1S1555 GATE
D120 1T23 BIAS
D135 TLR109 TX INDICATOR
S6 POWER
PL1 METER (INCLUDED IN METER)
L111 CHOKE
FUSE-1 3.15A
13.8V DC INPUT
POWER SUPPLY 13.8V RX … 250mA TX CW … 1.1A

SECTION 5
EXPLODED VIEWS

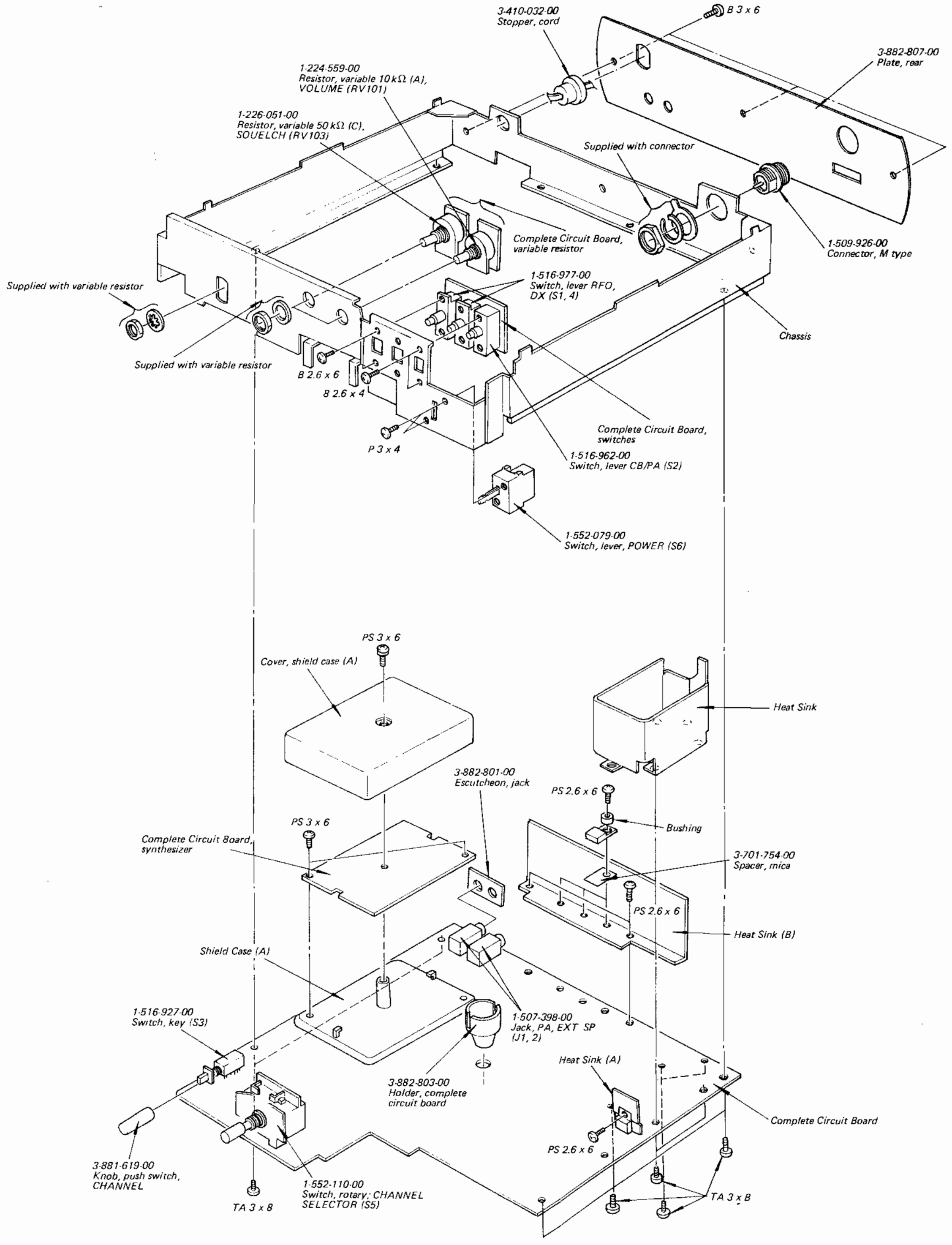
5-1.

Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head


A
B
C
1
2
3
4
5
3-881-633-0
Case, top
B 3 x 5, BLK
B 3 x 5, BLK
3-844-686-00
Cushion, rubber
1-520-302-00
Meter (ME)
B 3 x 5
3-831-441-XX
Cover, meter
B 3 x 5
TA, P 3 x 8
B 3 x 5
Supplied with connector
LED holder, CH indicator
Complete Circuit Board, LED
A-3643-016-A
Panel Ass'y, front
3-881-625-00
Cover, knob, power
8 3 x 5, black
3-881-626-00
Cover, knobs
3-881-609-00
Knob, POWER
1-508-863-21
Connector, 4-p, microphone
3-548-938-00
Knob
LED holder
8 3 x 5, black
3-881-606-00
Knob, VOLUME
3-881-629-00
Cushion, lower
3-881-605-00
Knob, Ass'y, CHANNEL SELECTOR
9-911-840-XX
Cushion, rubber
1-502-647-00
Speaker, SP
8 3 x 5, BLK
B 3 x 5, BLK
A-3642-001-A
Case Ass'y, bottom
1-532-403-XX
Fuse, 3.15 A
B 3 x 5, BLK
1-551-262-00
Wire with connector

5-2.


A
B
C
1
2
3
4
5
3-410-032-00
Stopper, cord
B 3 x 6
3-882-807-00
Plate, rear
1-224-559-00
Resistor, variable 10kΩ (A), VOLUME (RV101)
1-226-051-00
Resistor, variable 50 kΩ (C), SQUELCH (RV103)
Supplied with connector
Complete Circuit Board, variable resistor
1-509-926-00
Connector, M type
1-516-977-00
Switch, lever RFO, DX (S1, 4)
Supplied with variable resistor
Chassis
Supplied with variable resistor
B 2.6 x 6
8 2.6 x 4
Complete Circuit Board, switches
1-516-962-00
Switch, lever CB/PA (S2)
P 3 x 4
1-552-079-00
Switch, lever, POWER (S6)
PS 3 x 6
Cover, shield case (A)
Heat Sink
3-882-801-00
Escutcheon, jack
PS 2.6 x 6
Bushing
PS 3 x 6
Complete Circuit Board, synthesizer
3-701-754-00
Spacer, mica
PS 2.6 x 6
Heat Sink (B)
Shield Case (A)
1-507-398-00
Jack, PA, EXT SP (J1, 2)
1-516-927-00
Switch, key (S3)
Heat Sink (A)
3-882-803-00
Holder, complete circuit board
Complete Circuit Board
PS 2.6 x 6
3-881-619-00
Knob, push switch, CHANNEL
1-552-110-00
Switch, rotary; CHANNEL SELECTOR (S5)
TA 3 x 8
TA 3 x B

Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

Ref.

⇒ Q10
⇒ Q10
Q10
⇒ Q10
Q10

Q11
Q11
Q11
Q11
Q11

⇒ Q11
Q12
⇒ Q12
Q12
Q12

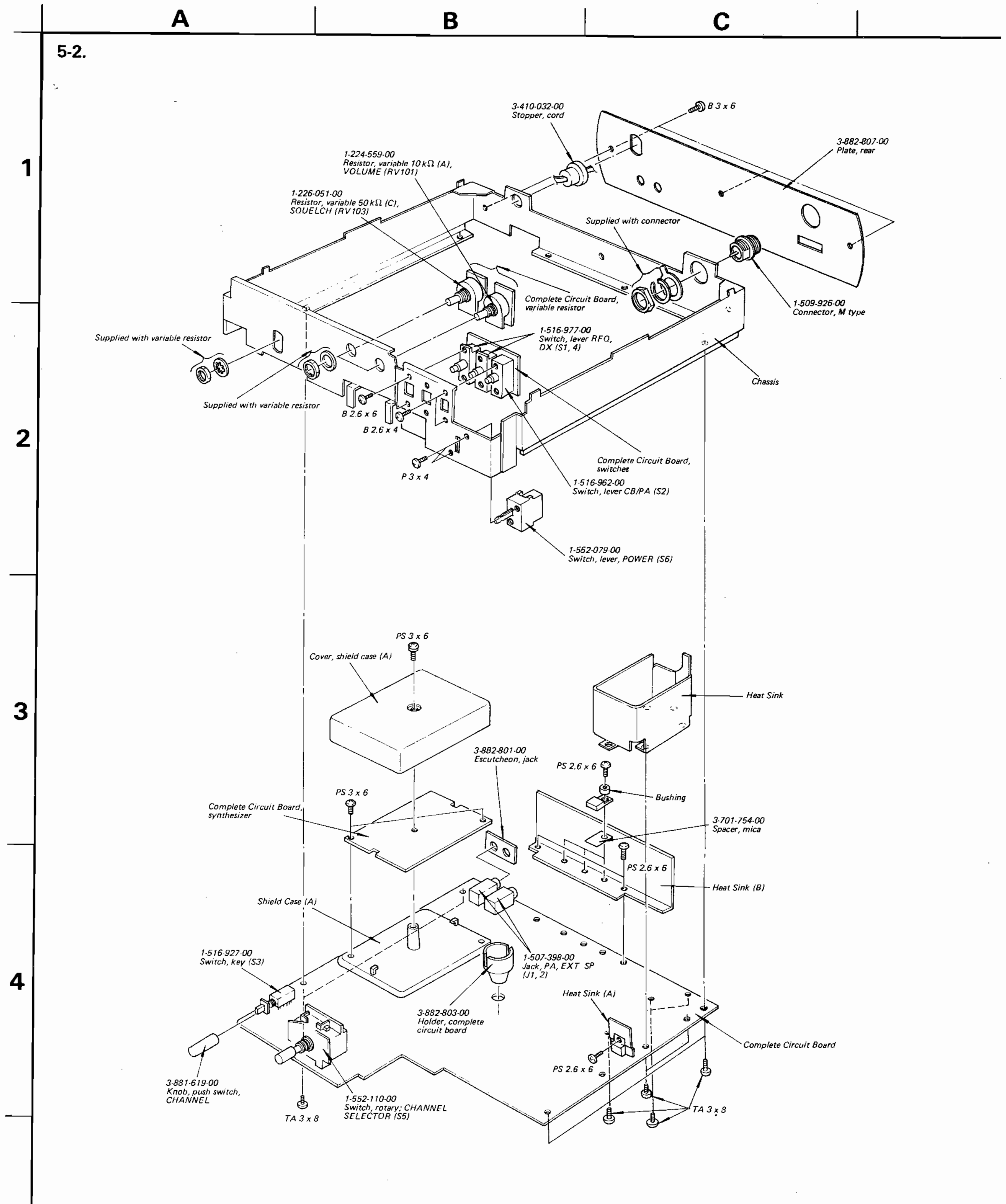
Q30
Q30
Q30
⇒ Q30
Q30
Q30

IC1
IC3
IC3

D10
D10
D10
D10
⇒ D11

D11
D11
⇒ D11

⇒:


A
B
C
1
2
3
4
5
5-2.
3-410-032-00
Stopper, cord
B 3 x 6
3-882-807-00
Plate, rear
1-224-559-00
Resistor, variable 10 kΩ (A),
VOLUME (RV101)
1-226-051-00
Resistor, variable 50 kΩ (C),
SQUELCH (RV103)
Supplied with connector
Complete Circuit Board,
variable resistor
1-509-926-00
Connector, M type
Supplied with variable resistor
1-516-977-00
Switch, lever RFO,
DX (S1, 4)
Chassis
Supplied with variable resistor
B 2.6 x 6
B 2.6 x 4
P 3 x 4
Complete Circuit Board,
switches
1-516-962-00
Switch, lever CB/PA (S2)
1-552-079-00
Switch, lever, POWER (S6)
PS 3 x 6
Cover, shield case (A)
Heat Sink
3-882-801-00
Escutcheon, jack
PS 2.6 x 6
Bushing
PS 3 x 6
Complete Circuit Board,
synthesizer
3-701-754-00
Spacer, mica
PS 2.6 x 6
Heat Sink (B)
Shield Case (A)
1-516-927-00
Switch, key (S3)
1-507-398-00
Jack, PA, EXT SP
(J1, 2)
Heat Sink (A)
3-882-803-00
Holder, complete
circuit board
Complete Circuit Board
PS 2.6 x 6
3-881-619-00
Knob, push switch,
CHANNEL
TA 3 x 8
1-552-110-00
Switch, rotary; CHANNEL
SELECTOR (S5)
TA 3 x 8

Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
(–) = slotted head

SECTION 6

ELECTRICAL PARTS LIST

SEMICONDUCTORS

Transistors

Ref. No.	*Part No.*	*Description*
⇒ Q101		2SK23A-824
⇒ Q102		2SC634A
Q103 – 106		2SC710
⇒ Q107, 108		2SC634A
Q109		2SC710
Q110		2SK58
Q111		2SC710
Q112		2SC773
Q113		2SC1760
Q114		2SC1816
⇒ Q115 – 119		2SC634A
Q120		2SC1474
⇒ Q121, 122		2SC1061
Q123, 124		2SA678
Q125		2SC1061
Q301		2SC710
Q302		2SA678
Q303		2SC710
⇒ Q304		2SC634A
Q305 – 307		2SC710
Q308		2SC1474

ICs

Ref. No.	*Part No.*	*Description*
IC101		MSM561
IC301		μPD861C
IC302		μA78L05AV

Diodes

Ref. No.	*Part No.*	*Description*
D101, 102, 103		1S1555
D104 – 106		1S1555
D107		VD1222
D108 – 110		1S1555
⇒ D111		1T22A
D112		10E2
D113		1S1555
⇒ D114		1T261
D115, 116		1S1555
⇒ D117		VD-1120
D118 – 119		1S1555
⇒ D120		1T22A
⇒ D121		EQB01-11Z
D122		10E2
D123		SL1272
D124 – 134		1S1555
D135		TLR109
D301, 302		1S1555
⇒ D303		FC52-C
D304		1S1555

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

COILS

Ref. No.	*Part No.*	*Description*
L101	1-407-173-XX	Microinductor, 220 μH
L102	1-407-187-XX	Microinductor, 5.6 μH
L103	1-409-310-00	L.P.F. Coil
L104	1-409-311-00	L.P.F. Coil
L105	1-407-187-XX	Microinductor, 5.6 μH
L106 – 109	1-407-186-XX	Microinductor, 4.7 μH
L110	1-407-187-XX	Microinductor, 5.6 μH
L111	1-441-855-00	Choke Coil
L112 – 115	1-407-186-XX	Microinductor, 4.7 μH
L117	1-407-179-00	Microinductor, 1.2 μH
L118	1-420-876-00	Coil, no core
L119	1-407-179-00	Microinductor, 1.2 μH
L120	1-420-877-00	Coil, no core
L121	1-407-179-00	Microinductor, 1.2 μH
L125, 126	1-459-193-00	Coil, core
L301	1-405-754-00	Osc, 16.27 ~ 16.71 MHz
L302	1-407-169-XX	Microinductor, 100 μH

TRANSFORMERS

Ref. No.	*Part No.*	*Description*
T1	1-423-232-00	Input
T2	1-425-969-00	Modulation/Output
IFT101	1-401-696-00	ANT
IFT102	1-425-374-21	RF

Ref. No.	*Part No.*	*Description*
IFT103	1-403-872-00	10.7 MHz
IFT104	1-403-110-00	455 kHz
IFT105	1-403-152-00	455 kHz
IFT106, 107	1-425-954-00	16 MHz
IFT108	1-425-953-00	27 MHz
IFT109, 110	1-425-744-00	27 MHz
IFT301, 302	1-425-947-00	Out, drive, 16.00 MHz
IFT303	1-403-243-00	10.24 MHz
IFT304	1-425-946-00	Tripler, 15.36 MHz

CAPACITORS

All capacitors are in μF and ceramic unless otherwise noted.
50WV or less are not indicated except for electrolytics.
pF = μμF, elect = electrolytic

Ref. No.	*Part No.*	*Description*		
C101	1-161-047-11	0.0047		
C102	1-101-004-11	0.01		
C103	1-161-047-11	0.0047		
C104	1-121-651-11	10	16 V	elect
C106	1-102-507-11	9 p		
C107 – 111	1-161-047-11	0.0047		
C112, 113	1-161-051-11	0.01		
C114	1-161-055-11	0.022		(boundary layer)
C116	1-101-005-11	0.022		
C117	1-121-651-11	10	16 V	elect
C118	1-121-391-11	1	50 V	elect
C119	1-107-073-11	33 p		mylar
C120	1-101-005-11	0.022		
C121	1-161-051-11	0.01		
C122	1-127-022-11	0.47	16 V	solid aluminum
C123	1-101-797-11	0.1		(boundary layer)
C124	1-101-796-11	0.05		(boundary layer)
C125, 126	1-121-392-11	3.3	25 V	elect
C127	1-121-419-11	220	6.3 V	elect
C128	1-161-055-11	0.022		(boundary layer)
C129	1-102-110-11	220 p		
C130	1-106-078-12	0.0068		mylar
C131	1-161-047-11	0.0047		
C132	1-131-192-11	4.7	10 V	tantalum
C134	1-161-047-11	0.0047		
C136	1-161-047-11	0.0047		
C137	1-101-797-11	0.1		(boundary layer)
C138	1-131-193-11	10	10 V	tantalum
C139	1-121-409-11	47	16 V	elect
C140	1-131-191-11	47	6.3 V	tantalum
C141	1-131-193-11	10	10 V	tantalum
C142	1-102-110-11	220 p		
C143	1-127-023-11	1	10 V	solid aluminum
C144	1-108-251-12	0.1		mylar
C146	1-108-252-12	0.15		mylar
C147	1-108-251-12	0.1		mylar
C148	1-101-796-11	0.05		(boundary layer)
C149	1-102-113-11	390 p		
C150	1-161-047-11	0.0047		
C151	1-131-238-11	10	25 V	tantalum
C152	1-161-053-11	0.015		(boundary layer)
C153	1-101-005-11	0.022		
C154	1-101-001-11	0.001		
C156	1-101-001-11	0.001		
C157	1-121-420-11	220	10 V	elect
C158	1-161-043-11	0.0022		
C159, 160	1-161-047-11	0.0047		
C161	1-121-395-11	4.7	25 V	elect
C162	1-161-047-11	0.0047		
C163	1-121-426-11	470	16 V	elect
C164	1-121-245-11	1000	16 V	elect
C167	1-101-006-11	0.047		
C168	1-121-657-11	1000	25 V	elect
C169, 170	1-101-006-11	0.047		
C171	1-161-051-11	0.01		
C172	1-107-076-11 1-107-077-11 1-107-078-11	43 p 47 p 51 p		mica mica mica

Ref. No.	*Part No.*	*Description*		
C173	1-107-092-11	200 p		mica
C174	1-107-089-11	150 p		mica
C176	1-106-058-12	0.001		mylar
C177	1-161-051 11	0.01		
C178	1-102-674-11	43 p		
C179, 180	1-106-074-12	0.0047		mylar
C181	1-102-668-11	15 p		
C182	1-161-051-11	0.01		
C183	1-102-508-11	10 p		
C184	1-102-673-11	30 p		
C186	1-161-047-11	0.0047		
C187	1-161-151-11	0.01		
C188 – 193	1-161-047-11	0.0047		
C194	1-161-039-11	0.001		(boundary layer)
C196	1-161-047-11	0.0047		
C197	1-161-055-11	0.022		(boundary layer)
C198	1-107-079-11	56 p		mica
C199	1-107-092-11	200 p		mica
C200	1-102-884-11	33 p		
C201	1-161-039-11	0.001		(boundary layer)
C202	1-161-055-11	0.022		(boundary layer)
C203	1-107-093-11	220 p		mica
C204	1-107-106-11	9 p		mica
C206	1-107-090-11	160 p		mica
C207	1-107-072-11	30 p		mica
C208	1-107-080-11	62 p		mica
C209, 210	1-161-051-11	0.01		
C211	1-161-039-11	0.001		(boundary layer)
C212 – 214	1-161-051-11	0.01		
C216	1-161-047-11	0.0047		
C217	1-161-053-11	0.015		
C301	1-101-004-11	0.01		
C302	1-161-051-11	0.01		
C303	1-121-391-11	1	50 V	elect
C304	1-101-004-11	0.01		
C306	1-101-004-11	0.01		
C307	1-161-051-11	0.01		

Ref. No.	*Part No.*	*Description*		
C308	1-101-004-11	0.01		
C309	1-102-958-11	20 p		
C310	1-102-973-11	100 p		
C311	1-101-004-11	0.01		
C312	1-121-651-11	10	16 V	elect
C313	1-101-004-11	0.01		
C314	1-107-096-11	300 p		mica
C316	1-107-094-11	240 p		mica
C317	1-102-883-11	27 p		
C318	1-102-761-11	75 p		
C319	1-161-045-11	0.0033		
C320	1-131-206-11	3.3	25 V	tantalum
C321	1-107-072-11	30 p		mica
C322	1-107-076-11	43 p		mica
	1-107-077-11	47 p		mica
	1-107-078-11	51 p		mica
	1-107-079-11	56 p		mica
C323	1-102-501-11	1 p		
C324	1-101-004-11	0.01		
C326 – 330	1-101-004-11	0.01		
C331	1-102-936-11	3 p		
C332 – 334	1-101-004-11	0.01		
C336	1-101-004-11	0.01		
C337	1-121-651-11	10	16 V	elect
C338	1-101-004-11	0.01		
C339, 340	1-102-978-11	220 p		
C341	1-121-413-11	100	6.3 V	elect
C342, 343	1-101-004-11	0.01		

RESISTORS

All resistors are in ohms. Common ¼W carbon resistors are omitted. Check schematic diagram for values.

RV101	1-224-559-00	10 k, variable; VOLUME
RV102	1-224-255-XX	100 k, adjustable
RV103	1-226-051-00	50 k, variable; SQUELCH
RV104	1-224-253-XX	22 k, adjustable
RV105	1-224-248-XX	470, adjustable

Ref. No.	*Part No.*	*Description*
		SWITCHES
S1	1-516-977-00	Lever, LOCAL/DX
S2	1-516-962-00	Lever, CB/PA
S3	1-516-927-00	1 Key, EMERGENCY CH
S4	1-516-977-00	Lever, METER SELECTOR RFO/SWR
S5	1-552-110-00	Rotary, CHANNEL SELECTOR
S6	1-552-079-00	Lever, POWER
		FILTERS
CF101	1-527-184-XX	Ceramic, 10.7 MHz
CF102	1-527-290-00	Ceramic, 455 kHz
		MISCELLANEOUS
J1, 2	1-507-398-00	Jack, PA EXT SP
ME	1-520-302-00	Meter
MIC	8-811-251-00	Microphone F160
RL1	1-515-284-00	Reed Relay
SP	1-502-647-11	Speaker
X101	1-527-294-00	X'tal, 10.695 MHz
X301	1-527-293-00	X'tal, 10.24 MHz
	1-508-863-21	Connector, 4-P microphone
	1-509-926-00	Connector, M type
	1-532-403-XX	Fuse, 3.15 A
	1-551-253-00	Wire with connector
	1-551-262-00	Wire with connector

ACCESSORIES & PACKING MATERIALS

Part No.	*Description*
X-3881-601-1 including:	FCC Documents
3-701-625-00	Bag, plastic
3-993-149-21	FCC Part 95
3-993-150-21	FCC Federal Register
3-993-151-21	FCC Form 505
3-993-152-21	FCC Form 5558
3-701-355-01	Label
3-701-613-00	Bag, plastic
3-701-618-00	Bag, plastic
3-881-640-00	Bracket
3-881-643-00	Cushion (lower)
3-881-644-00	Bag, protection
3-881-646-11	Carton
3-881-647-00	Cushion (upper)
3-995-773-21	Manual Instruction

Frequencys

Channel	Frequency	Channel	Frequency	Channel	Frequency
1	26.965 MHz	15	27.135 MHz	29	27.295 MHz
2	26.975 MHz	16	27.155 MHz	30	27.305 MHz
3	26.985 MHz	17	27.165 MHz	31	27.315 MHz
4	27.005 MHz	18	27.175 MHz	32	27.325 MHz
5	27.015 MHz	19	27.185 MHz	33	27.335 MHz
6	27.025 MHz	20	27.205 MHz	34	27.345 MHz
7	27.035 MHz	21	27.215 MHz	35	27.355 MHz
8	27.055 MHz	22	27.225 MHz	36	27.365 MHz
9	27.065 MHz	23	27.255 MHz	37	27.375 MHz
10	27.075 MHz	24	27.235 MHz	38	27.385 MHz
11	27.085 MHz	25	27.245 MHz	39	27.395 MHz
12	27.105 MHz	26	27.265 MHz	40	27.405 MHz
13	27.115 MHz	27	27.275 MHz		
14	27.125 MHz	28	27.285 MHz		

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